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PART II

ENVIRONMENTAL PROTECTION AGENCY

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MOTOR VEHICLES

Emission Control System Performance Warranty Regulations—Short Test Establishment

ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 85]

[FRL 689-6]

MOTOR VEHICLES

Emission Control System Performance Warranty Regulations—Short Test Establishment

AGENCY: Environmental Protection Agency.

ACTION: Proposed Rule.

SUMMARY: Section 207(b) of the Clean Air Act, 42 U.S.C. 1857f-5a, deals with the periodic inspection of motor vehicles to determine whether they comply in actual use with applicable air pollution emission standards, and with the remedy of any deficiencies identified in such inspections. Two separate rulemakings are required to fully implement Section 207 (b): (a) The establishment by regulation of testing methods and procedures for ascertaining whether a vehicle complies with the emission standard, and (b) the establishment by regulation of a warranty by which the owner of a vehicle that fails to demonstrate in such a test that it complies with emission standards will have his vehicle repaired without cost by its manufacturer if the owner has properly operated and maintained his vehicle.

This Notice of Proposed Rulemaking deals with the first of these matters, i.e., the establishment of testing methods and procedures for ascertaining whether a vehicle complies with emission standards. Regulations dealing with the warranty for cars failing such a test are being proposed today as Subpart V of Part 85 of Title 40 of the Code of Federal Regulations.

DATES: All relevant material received on or before August 23, 1977, will be considered.

Final regulations, modified as the Administrator deems appropriate after consideration of comments, will be promulgated as soon as practicable after such consideration and will be applicable to model year 1979 and later light-duty vehicles and light-duty trucks.

ADDRESS: Interested persons may participate in this rulemaking by submitting written comments to the Administrator, Environmental Protection Agency, Attention: Office of Mobile Source Air Pollution Control (AW-455), 401 M Street SW., Washington, D.C. 20460. Ten copies are requested but not required.

FOR FURTHER INFORMATION CONTACT:

Paul Lapsley, Regulatory Management Staff, Office of Mobile Source Air Pollution Control, Environmental Protection Agency, Washington, D.C. 20460 at 202-755-0596.

SUPPLEMENTARY INFORMATION:

STATUTORY REQUIREMENTS AND PURPOSE

The statutory requirement for a "short test" capable of being correlated with the Federal Test Procedure is stated in Section 207(b) of the Clean Air Act:

> If the Administrator determines that (1) there are available testing methods and procedures to ascertain whether, when in actual use throughout its useful life (as determined under section 202(d)), each vehicle and engine to which regulations under section 202 apply complies with the emmission standards of such regulations, (ii) such methods and procedures are in accordance with good engineering practices, and (iii) such methods and procedures are reasonably capable of being correlated with tests conducted under section 206(a)(1), then—
>
> (1) he shall establish such methods and procedures by regulation, * * *

The requirement that the 207(b) test (hereinafter called a short test) reasonably correlate with the Federal Test Procedure (FTP) conducted under section 206(a)(1) has proved to be a difficult and controversial task. A short test must be performed in a short time on a fully warmed up vehicle, is limited at best to a very few vehicle speed/load conditions, and will be performed under a wide range of environmental conditions (i.e., temperature, humidity, human factors and instrument factors which are either uncontrollable or under limited control). Conversely, the FTP is performed with a cold start, includes a very large number of vehicle speed and load conditions simulating a typical stop-and-go urban commutation, and is performed under closely controlled laboratory environmental conditions (temperature and humidity are rigidly controlled and test personnel are under engineering quality control supervision).

The identification of testing methods and procedures and the determination that these methods and procedures are in accordance with good engineering practice and are reasonably capable of being correlated with tests conducted under section 206(a)(1) has involved the agency in an extensive testing program in which the short tests (plus the FTP) were administered to each vehicle in the following fleets:

a. *The Experimental Catalyst Fleet.* This fleet consisted of approximately fifty 1973 model year automobiles which had been fitted with catalysts and secondary air injection.

b. *The 1974 Model Year Fleet.* This fleet consisted of approximately one hundred and fifty privately owned 1974 model year automobiles and represented non-catalyst 1975 technology.

c. *The Defects Test Fleet.* This fleet was comprised of five catalyst-equipped cars. The vehicles were first set to the manufacturers' specifications and then a series of defects were introduced and the subsequent effect on emissions recorded.

d. *300-Car Test Fleet.* Approximately one hundred 1975 model year privately owned production vehicles were selected in each of three cities: Chicago, Houston and Phoenix.

In addition, EPA has another program planned to generate additional data on correlatability:

e. *State/EPA Pilot Project.* Approximately 2400, 1975/76 model year light-duty vehicles will be tested in Portland, Oregon by the FTP and the proposed short tests. Approximately 86 engine-vehicle groups will be represented in the sample.

Finally, EPA is evaluating commercially available test equipment for measuring hydrocarbons (HC), carbon monoxide (CO) and oxides of nitrogen (NOx) in terms of accuracy, repeatability, response time and deficiencies in order to provide reports on which is acceptable.

THE PROPOSED REGULATIONS

On the basis of the data which have been collected from light-duty vehicles in the four test fleets described above, the Agency proposes that all of the following five tests be designated as "short tests" which meet the statutory requirements of availability, correlation and good engineering practice: The idle test, the Federal 3 Mode, the Clayton Key Mode,[1] The Federal Short Cycle, and the N.Y./N.J. composite test. These test procedures are discussed in detail in Subpart W and briefly described below.

(a) *Idle test.* The raw exhaust gas is measured with simple instrumentation to determine HC and CO concentration in the raw exhaust gases with the engine in an idling condition. Procedural variations of the idle test studied included running the test with the automatic transmission in neutral vs. drive, and idle speed at normal RPM vs. high RPM with the transmission in neutral. NO_x concentration cannot be meaningfully measured at idle since NO_x emissions are insignificant under idle conditions—an important limitation of the idle test. The idle test has been the predominant inspection test procedure utilized in currently operational and contemplated state programs.

(b) *Steady State Modal Tests. (Federal 3 Mode and Clayton Key Mode).* The raw exhaust gas is measured with simple instrumentation to determine HC, CO, and NO_x concentrations while the vehicle is driven under prescribed load conditions at two different speeds and at idle. A dynamometer is used in this test to simulate nonvarying speed and load conditions. Procedural variations between the two tests involve the severity of the load simulated. The Clayton Key Mode test is currently being evaluated by the states of Arizona and California.

(c) *Transient tests. (Federal Short Cycle and NY/NJ Composite Test).* A sample of the dilute exhaust gas (a CVS unit is used)[2] is collected in a bag while the vehicle is driven on a dynamometer to simulate a driving cycle that includes acceleration, deceleration, and cruise modes. The sample accumulated in the bag is analyzed for MC, CO, and NO_x concentration. The concentration values

[1] The Clayton Manufacturing Company has applied for patents on the Key Mode emissions test procedure and has stated its intent to charge fees for use of the diagnostic information provided with the test results. The status of the patent and the extent to which it applies to other steady state modal tests is unknown at this time.

[2] Substitution of a less costly procedure for obtaining the sample than a Constant Volume Sampler (CVS) may be possible. A substitute procedure was not evaluated.

measured are converted to a mass (gm/mile) basis. At present there is no field experience data available for these tests and no state is using or contemplating the use of such a test. In theory a large number of different transient tests are possible for simulating different driving cycles; however, in practice only two cycles have been studied: (1) A composite of the N.J. and the N.Y. Short Test and (2) the EPA Short Cycle Test developed by the Office of Mobile Source Air Pollution Control.

Both the idle test and the steady state modal tests have been used in state I/M programs. Because of the differences in equipment, manpower requirements and time required to conduct steady state modal tests over the idle test, the choice between these two tests is dependent upon the incremental improvement in accuracy and correlation derived by the steady state modal tests. The transient tests, requiring greater investment in resources, have not been implemented to date by state or local governments.

The Agency proposes, therefore, to specify these five short tests as being suitable for use, either in total or in part (where so identified), in light-duty vehicles and light-duty truck inspection programs; to identify the methodology which has been used in defining correlation for these tests; to specify the mathematical methodology to be used in the setting of short test cutpoints (that value, as measured by appropriate instruments for each pollutant, above which the vehicle fails the short test); and to specify the methodology which will be used to collect the data from which the short test cutpoints will be developed.

Implementation of Performance Warranty

Implementation of the warranty provisions of section 207(b), after the warranty regulations are promulgated by EPA, will occur when a vehicle which has been properly maintained and operated fails to conform at any time during its useful life (5 years or 50,000 miles, whichever first occurs) to the applicable emissions standards and such nonconformity results in the ultimate purchaser of such vehicle having to bear any penalty or other sanction (including the denial of the right to use such vehicle) under State or Federal law. The determination of whether a vehicle is conforming to applicable emission standards will most likely occur through the adoption of any one of the designated short tests and its associated cutpoints into a State or local government vehicle inspection program.

Currently available evidence indicates that the appropriate short test cutpoints for new model year vehicles will have to be established on a yearly basis. Further testing may reveal that cutpoints need not be set annually or for as many groups of vehicles as anticipated which would result in the development of short test cutpoints on an as needed basis. These cutpoints would remain in effect thrpughout the useful life of each vehicle. (Provisions are included in §85.2306 of Subpart X to enable the EPA or the manufacturers to modify the short test cutpoints over time, given that sufficient data can be provided which indicate that the cutpoints for a given group need to be revised. Provisions are also included for the updating of the cutpoints at the time of significant manufacturer changes to a vehicle covered by certification. There are essentially three options for establishing the cutpoints: states can determine the cutpoints, or they can be provided by EPA, or the manufacturers could provide the data on the basis of which cutpoints would be set either by the states or the EPA.

Although the procedures being proposed herein are aimed at the development of cutpoints by the Agency, it is feasible that the cutpoints can be developed by the states using the methodology being proposed by the agency. Comments on the way in which states would implement these provisions and the desirability for such implementation as part of the states' inspection and maintenance programs are requested. Comments are also requested on the feasibility and desirability of permitting or requiring each individual manufacturer to utilize the methodology for generating the data on the basis of which cutpoints will be set, and providing the resulting data to the EPA or to the several states for the setting of cutpoints; since it is obvious that each individual manufacturer would have a significant incentive to establish the cutpoint for his cars at the highest possible level, so as to minimize potential warranty claims, comments should include a discussion of how the EPA or the States might best supervise and control the process of data generation by manufacturers so as to assure that the resulting data are valid.

In the case that the agency develops the cutpoints, they would be developed through yearly programs wherein new model-year, privately owned, production vehicles and/or vehicles at the assembly line are tested by the FTP and by each short test. Sufficient quantities of vehicles would be obtained so as to furnish statistically meaningful results. The short test cutpoints would be determined on the basis of these data in accordance with the methodology set forth in these regulations and would then be disseminated to each state for use in its vehicle inspection program.

Discussion of Issues

(a) correlation methodology

Statistically, three different methodologies are associated with the concept of correlation: Regression analysis, ranking analysis and contingency table analysis.

Regression analysis is a technique by which one parameter of interest is predicted by one or more other variables of interest. Thus, a functional relationship is defined between the variables. For every value or set of values for the predictor variable, there is a value of the predicted variable.

Regression analysis can be performed with one or more predictor variables (independent variables) and with one or more predicted variables (dependent variables). When there is one dependent variable and one independent variable, the technique is usually called simple regression. A regression analysis is based upon the assumption of a relationship between the dependent and independent variables.

Most regression is based upon the "least squares" approach, although other approaches could be used. Thus, the coefficients are selected to minimize the sum of the squares of the actual values minus the predicted values. Least squares is the preferred approach since it provides estimates of the coefficients which have the minimum possible variance.

For the case of 207(b) correlation, the dependent variable is the Federal Test Procedure (FTP) emission for a specified pollutant. The independent variable is the short test emission for the same pollutant. In cases where the short test has more than one mode, there are multiple independent variables.

The disadvantage of using a regression methodology to evaluate correlation is that determination of the exact form of the functional relationship is necessary. Also, it is equally important to predict each and every dependent data point with the same absolute degree of accurarcy. Thus, a given error in the prediction of a gross emitter will affect correlation as much as the same error in a vehicle which just fails the Federal standards.

Ranking analysis is a technique by which two variables are compared without any assumption as to a predictable relationship between the variables. Each variable is compared and ordered within itself with the largest value of each variable assigned the rank of 1. Then the ranks of each pair of variables are subtracted and the differences are summed. The rank correlation coefficient is a function of the number of data points and the sum of the differences: it will be low when the variables are independent and high when they are correlated.

A rank correlation value near 1 indicates that two variables, when normalized, tend to be high or low together. A rank correlation near zero indicates that the relative rank of one variable cannot predict the relative rank of the second variable. A high but nonperfect rank correlation, however, does not allow for an assessment of the magnitude of error which would occur with the prediction process.

Contingency table analysis assumes that there is a discrete number of groups of individual measurements of a given dependent variable. There are also one or more independent variables. The analysis attempts to find one or more independent variables which can be used to discriminate between the different classes of the dependent variable. In other words, the contingency table approach says that a predictive relationship between the dependent and inde-

pendent variables is not important. Rather, the only thing of interest is that the independent variable be able to classify the dependent variable into one of the available group categories. Contingency table analysis is based upon the assumption that cutpoints can be found for one or more independent variables which will discriminate among the groups of the dependent variable. The selection of the cutpoints results in the development of a contingency table.

Contingency tables are considerably simpler to deal with than regression analyses since it is not necessary to determine the exact predictive relationship. Rather, it is sufficient to identify the number of important groups into which the dependent variable needs to be classified. For the purposes of 207(b) implementation, there are only two such groups: Vehicles which pass the FTP and vehicles which fail the FTP. Thus, Figure 1 shows the 207(b) application of a contingency table.

Predicted variable

	(FTP) of—	
	Pass	Fail
Predictor variable (short test):		
Pass	Correctly passed	Incorrectly passed by the short test (error of omission).
Fail	Incorrectly failed by the short test (error of commission).	Correctly failed.

FIGURE 1

The definition of correlation in a contingency table can be addressed in several ways (unlike regression analysis correlation or rank correlation). First, a measure of independence between the two variables can be determined. This indicator will fall between −1 and +1, as did the other measures of correlation. Because of the simple form of the predictive relationship inherent in the table, other more meaningful measurement quantities can be computed, e.g., the ratio of vehicles failing the short test to vehicles failing the FTP, the ratio of cars incorrectly failing the short test to the total number of cars failed by the short test, etc. These quantities express the ability of the short test to correctly identify passing and failing vehicles on the FTP. A selection as to which of these quantities best expresses correlation depends upon the specific application, the relative importance of the types of errors, and the magnitude of the correctly identified vehicles.

It was anticipated that the short tests would not correlate with the FTP in a classical statistical sense, i.e., no short test is capable of a reliable and consistent prediction of the FTP mass emissions. The extensive fleet tests verified that the statistical correlation coefficients arrived at through regression techniques were low (generally less than 0.8), indicating unacceptable correlation.

However, EPA interprets the Clean Air Act requirement of "reasonable correlation" to be met if the short test is capable of reliably and consistently predicting whether the vehicle would pass or fail the FTP even if it cannot give the magnitude of the passing or failing margin. Therefore, the contingency table approach has been adopted as the method for determining correlation between the FTP and selected short tests. The reasonableness of such correlation depends on the ratio of incorrect predictions to correct predictions. In the case of the 207(b) short test the incorrect predictions are of two types, errors of commission and errors of omission, each with significantly different consequences. An error of commission (i.e., the short test incorrectly predicts failure for a vehicle that really passes the FTP) would cause a vehicle which conforms to all Federal emission requirements to be repaired under warranty at some cost to the manufacturer. It is possible, however, that air quality benefit may still be obtained from vehicles which are in conformance with the emission standards at the time of failure; vehicles in a good state of tune can often emit at levels substantially below the emission standards, especially at low mileage. An error of omission (i.e., the short test incorrectly passes a vehicle that would fail the EFP) has no cost impact on the manufacturer but represents a lost opportunity for air quality improvement.

By varying the severity of the short test cutpoint (i.e., the numerical value used to predict passing or failing on the FTP) it is possible to reduce errors of commission to any desired level, but always at the cost of increasing errors of omission.

(b) GOOD ENGINEERING PRACTICE

The criterion of good engineering practice must be resolved in terms of whether the test(s) can: (1) Be conducted with reasonable demands upon test personnel and equipment and (2) yield reasonably accurate and reproducible results when the test is performed as specified. All five of the short tests identified in these proposed regulations meet these criteria. The basis for this conclusion is explained in detail in: Regulatory Support Document—Section 207(b) NPRM. Single copies may be obtained from the Director, Emission Control Technology Division, 2565 Plymouth Road, Ann Arbor, Michigan 48105; a copy is also on file in the EPA Public Information Reference Unit, Room 2922 Waterside Mall, U.S./EPA, 401 M Street SW., Washington, D.C. 20460.

(C) SHORT TEST STANDARDS DEVELOPMENT

On a yearly basis, the Agency proposes to test vehicles of the latest model year which are privately-owned production vehicles and/or vehicles at the assembly line. (Further testing may reveal that cutpoints need not be set annually or for as many groups of vehicles as anticipated, which would result in the Agency providing short test cutpoints on an as-needed basis). The vehicles will be tested by each approved short test and by the FTP. Vehicles will be selected for testing on the basis of those engine/vehicle size/emissions control technology combination(s) (called groups) which are in production and which are significantly different. A sufficient number of vehicles will be tested in each group to satisfy statistical requirements for sample size. The data will be collected during the first nine months of the model year (these data could also serve to supplement Section 207(c), the "recall" provision, of the Clean Air Act if testing is performed with rigorous quality control). The Agency will analyze the data by the prescribed methodology and select the short test cutpoints for each group. Consolidation within groups of the final number of short test cutpoints will be performed in accordance with the methodology prescribed. The effects of real world variables (temperature, humidity, human factors, instrumentation, etc.) on short test cutpoints as determined by the state/EPA pilot project being conducted in Portland, Oregon, will be incorporated in the sets of short test cutpoints which are furnished to each state or local government.

Because errors do occur in the categorization of vehicles in the contingency table and because of the relative difference in importance of the two types of errors (Errors of Commission (Ec) and Errors of Omission (Eo), the Agency is proposing five approaches for the selection of the short test cutpoints. These five approaches are stated below and the one which is judged to best fulfill the requirements of Section 207(b) based on the data which the Agency has available and on the comments received from this notice of proposed rule making will be adopted.

Option 1. Set the short test cutpoints at the level which corresponds to a 5 percent error of commission rate (based on the total number of vehicles tested) within each group.

This method has several advantages. First, it is easy to implement. Second, each vehicle group manufacturer will be incorrectely penalized for the same fraction of his sales of that vehicle as every other vehicle group manufacturer. There are some disadvantages to this method. This occurs when the number of vehicle groups is greater than one. First, the mean FTP emissions of failed vehicles in group 1 may be very different from the mean FTP emissions of failed vehicles in group 2 even though both short test pass/fail cutpoints were set to ensure 5 percent commission errors. Second, vehicle group 1 may contain a greater percentage of error of omissions than vehicle group 2 and thus be required to repair fewer vehicles than vehicle group 2, even though both groups have the same percentage of vehicles exceeding emission standards when measured by the FTP. Third, assume that vehicle group 1 has extremely high short test variability. Then, it is likely that due to short test variability, cars with low FTP emissions will have high short test levels. This situation will result in a higher

short test pass/fail cutpoint than for a low test variability class, since high test variability increases commission errors and omission errors. Thus, a manufacturer could be rewarded for high short test variability. The same situation could occur with high FTP variability.

Option 2. Set the short test rejection ratio, $(E_c+FF)/(E_c+FF)$, equal to unity. (Vehicles which are correctly failed by the short test are classified as "FF" vehicles.)

This option is no more difficult to implement than the fixed error of commission approach. It treats all manufacturers equitably and does not give any advantage to manufacturers who produce vehicels with high FTP and/or ST (short test) variability. Rather, it encourages improvements in emissions performance because the manufacturer is never allowed to repair fewer vehicles than he should, i.e., true FTP failing vehicles. This approach does not permit the setting of a single ST cutpoint for all vehicles. This is true for all equitable approaches for setting cutpoints and therefore cannot be treated as a negative characteristic of the method. Air quality benefits will tend to improve from the original approach because the error of omission rate will be lowered. However, mean FTP emissions of failed vehicles in two different groups could still be significantly different. Many manufacturers will have to repair more error of commission vehicles than under the original concept.

Option 3. Set a fixed level of $E_c/(E_c+FF)$ for each group.

This option is more difficult to implement since $E_c/(E_c+FF)$ can be small when FF is large or when E_c is small. Thus, there is more than one way to satisfy the function. This option does, however, have the potential for crediting manufacturers of vehicle classes which have low FTP failure rates. This option does not alter the variability considerations of the first approach.

Option 4. Set the short test cutpoints so that equivalent FTP pass/fail levels are enacted for each vehicle group while maintaining the error of commission rate at five percent or less. This option has the potential for crediting groups with low FTP emissions but at the expense of increasing errors of omission. In fact, under certain circumstances, the group having the highest true failures could experience the greatest increase in errors of omission.

Option 5. Set an error of commission rate or $E_c/(E_c+FF)$ rate as a function of test variability. Allow a five percent error of commission rate when test variability is at the maximum acceptable level.

This option eliminates the variability problem inherent in Options 1 and 3. A functional relationship between errors of commission or $E_c/(FF+E_c)$ and variability could be developed using mathematical simulation techniques. This could be accomplished by taking a set of data and, using probability distribution theory and random numbers, variability could be introduced into the data base at different levels. Then, using fixed short test cutpoints, commission errors can be computed and plotted against variability.

These five approaches for the selection of short test cutpoints are detailed in Subpart X, § 85.2308. While more extensive analysis has been completed on some of these approaches, further efforts are aimed at examining the potential effects of adopting any of the five approaches for selecting short test cutpoints. Comments are particularly requested on each of the above approaches.

(d) REAL WORLD CONSIDERATIONS

All of the data available to EPA on the correlation of short tests to the FTP have been established under laboratory conditions. Inspection of vehicles at state inspection lanes will occur under varying atmospheric conditions and will also be subject to personnel errors as well as problems associated with correct instrument calibration and maintenance. The Portland study is being performed by the Agency to quantify the effects of these variables on short test correlation and to determine the effectiveness of the short test in the real world. Once the magnitudes of these variables have been quantified, they will be factored into the cutpoints for 207(b) to be published by the Agency. Incorporation of these variables will not result in unacceptable error rates or correlation. However, they may reduce the predicted air quality benefits relative to those projected from laboratory data.

(e) EFFECTS ON STATE I/M PROGRAM

Publication of Section 207(b) cutpoints will not require their adoption by a state or local government. However, if the cutpoints used by a state or local government are less stringent than the 207(b) cutpoints, then that locality will not be achieving as great an air quality improvement from its I/M program as possible. The only vehicle owners who would be afforded the warranty protection of section 207(b) are those whose emissions exceed the state I/M cutpoints. The opposite scenario, i.e., where the state cutpoints are more stringent than the section 207(b) cutpoints, could also exist. In this case, only those vehicles whose short test levels exceed the 207(b) cutpoints would be covered by warranty. The owners of vehicles whose short test values were below the 207(b) cutpoints but above the state standards would have to bear the cost of repairing their own vehicles.

Each state will have to evaluate the relative merits of either adopting the 207(b) cutpoints or adopting less stringent or more stringent short test pass/fail values.

(f) NEED FOR NEW SHORT TEST DEVELOPMENT

In light of the rapid changes which are taking place in the technology being used to meet the present and future emissions standards, it is possible that cases will occur where the proposed short tests will not function effectively as predictors of the FTP emissions from those vehicles. Should this possibility occur, the Agency will implement one or more new short tests which will apply to these new technology vehicles.

(g) ANTICIPATED AIR QUALITY BENEFITS

Because of the intimate relationship between I/M and the execution of a 207 (b) program, it is very difficult to separate their respective effectivenesses. The predicted effectiveness is, therefore, presented in two ways. The first case is for a joint 207(b)/Inspection and Maintenance program, where the 207(b) cutpoints (E_c=5 percent) are used and no I/M program previously existed. The second case is where an I/M program existed prior to the implementation of 207(b) and had been failing approximately ⅓ of the vehicles in each model year. In this case the 207(b) cutpoints (E_c=5 percent) are adopted following implementation of section 207(b). The effectiveness is expressed as a percent reduction in total emissions over the useful life of the vehicles.

Effectiveness of sec. 207(b) over the useful life of the vehicle

Case I (no prior I/M) (percent)			Case II (previous I/M programs) (percent)		
HC	CO	NOx	HC	CO	NOx
34.6 to 21.1	42.8 to 24.6	2.0 to 0.33	7.6 to 6.4	8.7 to 7.8	0.22 to 0.09

The technical issues involved in preparing the various short tests and statistical procedures are discussed in detail in: Regulatory Support Document Section 207(b) NPRM.

(h) APPLICABILITY OF 207(b) TO LIGHT-DUTY TRUCKS

At the present time, available vehicle test data on the short tests and the FTP have only been measured on light-duty vehicles. Before final rulemaking, data will be available on light-duty trucks. Because light-duty trucks are similar to light-duty vehicles both in engineering design and in usage, the same tests which are appropriate for light-duty vehicles are expected to be appropriate for light-duty trucks. The specific short test cutpoints for light-duty trucks may differ from the light-duty vehicle cutpoints and will be determined in a separate test program. However, the methodology for determining the cutpoints is expected to apply to both light-duty vehicles and light-duty trucks.

REQUEST FOR COMMENTS

EPA is particularly interested in receiving comments and information on the following topics:

1. Appropriateness in terms of correlatability and good engineering practice of the proposed test procedures for light-duty vehicles and light-duty trucks.

2. Appropriateness of the test procedures proposed with respect to existing technology and "new" technology.

3. Appropriateness of the short test cutpoint selection methodologies proposed for light-duty vehicles and light-duty trucks. What is the most equitable approach, which is the most applicable in practice? Who should establish the cutpoints? In which way would the states establish the cutpoints?

4. Alternative methods for determining short test cutpoint values. Particularly, should some weighting factor be used to balance errors of commission and omission in terms of air quality? Also, what approach should be taken when no car in the test group exceeds the standards or all cars in the test group fail the standards?

5. Should prototype or new assembly line vehicles be used instead of privately owned vehicles in the test group? This might involve inducing typical faults. What are typical faults and what are typical failure rates on the assembly line?

6. Problems anticipated by the manufacturers caused by including the short tests in all tests performed on certification and/or assembly line vehicles—both at the EPA laboratory and at their facilities.

7. Should the short test cutpoints be based on a small number of broad groupings of vehicles (e.g., according to five engine displacement categories) rather than the engine/vehicle/technology groups proposed for use in determination of short test cutpoints?

8. Suggestions for a uniform report format and test card information. Assess the difficulty in ensuring that vehicles are tested under proper conditions, weights and shift points—running changes during year, etc.

9. Suggestions on labeling of vehicles to ensure that they are properly identified by the vehicle's inspection lane operators. Can this be incorporated into the Vehicle Identification Number (VIN) or should it be an under hood label?

10. What is reasonable short test variability and how should it be defined and incorporated?

A copy of all public comments will be available for inspection and copying at the U.S. Environmental Protection Agency, Public Information Reference Unit, Room 2922 (EPA Library) 401 M Street SW., Washington, D.C. 20460. As provided in 40 CFR Part 2, a reasonable fee may be charged for copying services.

Notice is hereby given that Part 85 of Title 40 of the Code of Federal Regulations is proposed to be revised by the addition of new Subparts W and X as set forth below.

This Notice of Proposed Rulemaking is issued under authority of section 207(b) of the Clean Air Act, as amended (42 U.S.C. 1857f–5a).

NOTE.—The Environmental Protection Agency has determined that this document does not contain a major proposal requiring preparation of an Inflation Impact Statement under Executive Order 11821 and OMB Circular A–107.

Dated: May 6, 1977.

DOUGLAS M. COSTLE,
Administrator.

It is proposed to amend Part 85 of Chapter I, Title 40 of the Code of Federal Regulations by adding Subpart W and Subpart X as follows:

Subpart W—Section 207(b) Exhaust Emission Test Procedures

Sec.
85.2201 General Applicability.
85.2202 Definitions.
85.2203 Abbreviations.
85.2204 Overview.
85.2205 Transient test specifications, overview.
85.2206 Transient test procedures, general requirements.
85.2207 Federal short cycle test specifications.
85.2208 Federal short cycle test—calculations.
85.2209 New Jersey/New York composite test specifications.
85.2210 New Jersey/New York composite test—calculations.
85.2211 [Reserved]
85.2212 Dynamometer systems.
85.2213 Exhaust gas sampling system.
85.2214 Calibration procedures for transient mode tests.
85.2215 [Reserved]
85.2216 Steady state modal test specifications, overview.
85.2217 Steady state modal test procedures, general requirements.
85.2218 Clayton Key Mode test specifications.
85.2219 Federal Three Mode test specifications.
85.2220 Equipment specifications — steady state modal tests.
85.2221 Dynamometer system.
85.2222 Exhaust gas sampling system.
85.2223 Calibration procedures — steady state modal tests.
85.2224 [Reserved]
85.2225 Idle test specifications.
85.2226 Equipment specifications—Idle test.
85.2227 Dynamometer system.
85.2228 Exhaust gas sampling system.
85.2229 Calibration procedures—Idle test.

Subpart X—Section 207(b) Short Test Cutpoint Methodology

85.2301 General applicability.
85.2302 Definitions.
85.2303 Overview.
85.2304 Vehicle grouping.
85.2305 Data collection.
85.2306 Short test cutpoint selection.
85.2307 Analytical technique.
85.2308 Cutpoint selection methodologies.

AUTHORITY: Sec. 207(b), Clean Air Act, as amended (42 U.S.C. 1857f–5a).

Subpart W—Section 207(b) Exhaust Emission Test Procedures

§ 85.2201 General applicability.

This subpart contains short test exhaust emission test methods to be used in implementing the emissions control system performance warranty regulations. The provisions of this subpart are applicable to 1979 and later model year light-duty vehicles and 1979 and later model year light-duty trucks.

§ 85.2202 Definitions.

The following definitions apply to this subpart beginning with the 1979 model year. Section 86.078–2 remains effective excepting those definitions which are hereby superseded and/or added.

"Car line" means a name denoting class of vehicles within a make or car division which has a degree of commonality in construction (e.g., body, chassis). Car line does not consider any level of decor or opulence and is not generally distinguished by such characteristics as roof line, number of doors, seats or windows except for station wagons. Station wagons are considered to be different car lines than passenger cars.

"Calibration" means the set of specifications, including tolerances, unique to a particular design, version, or application of a component or component assembly capable of functionally describing its operation over its working range.

"Clustering" means the tendency of data points, when plotted on cartesian coordinates, to appear together in distinct, compact groups.

"Discrimination" means the division of a batch of data points into 2 or more distinct groups, e.g. the division of vehicle emission data obtained by the FTP and short test(s) into groups of Ec, Eo, FF, and PP.

"Driver's Aid" means a device which graphically displays the speed-time requirements of a given test schedule and the actual vehicle test speed to assist the test technician in maintaining the proper vehicle speeds throughout the test.

"Group" means a classification of vehicles into classes having the same manufacturer, engine displacement, cylinder block configuration (e.g. V–8, I–6, etc.), number of cylinders, fuel injection or carburetion (number of carburetors, and number of carburetor venturies), emission control systems, inertia weight, and car line.

"Instrument-to-instrument variation" means variations in calibration (zero and span point) settings and/or test readings between two (or more) identical instruments produced by the same manufacturer when measuring samples from the same source (e.g. gas bottles or vehicle exhaust).

"Laboratory conditions" means a testing environment (e.g. test cell) in which as many test variables as possible are controlled (e.g. ambient temperature and humidity, on-the-job human errors) and laboratory grade instrumentation is used (when possible).

"Light-Duty Truck" means any motor vehicle, rated at 8,500 pounds GVW or less which has a vehicle curb weight of 6,000 pounds or under and which has a basic vehicle frontal area of 46 square feet or less, which is: (1) Designed primarily for purposes of transportation of property or is a derivation of such a vehicle or (2) designed primarily for transportation of persons and having a capacity for more than 12 persons, or (3) available with special features enabling off-street or off-highway operation and use.

"Light-Duty Vehicle" means a passenger car or passenger car derivative capable of seating 12 passengers or less.

"Make" means the division or similar name within a manufacturing corporation which appears on the vehicle, e.g., Chevrolet, Mercury, Dodge etc.

"Manufacturer-to-manufacturer instrument variation" means variations in calibration (zero and span point) settings and/or test readings between two (or more) instruments intended for the same use (i.e., HC analyzers) but produced by different manufacturers when measuring samples from the same source (e.g. gas bottles or vehicle exhaust).

"Manufacturer" means the major financial entity whose divisions market vehicles, e.g. General Motors, Ford Motor Company etc.

"Overheating" means engine operating temperature in excess of the temperature for which the engine and engine systems were designed, as evidenced by temperature warning light on, temperature gauge reading in the hot region, stalling or rough idling.

"Owner" means the ultimate purchaser or subsequent purchaser in whose name the vehicle is titled at the time that the short test is performed.

"Precision" means the standard deviation of replicated measurements.

"Production tolerances stack-up" means each component of an assembly is manufactured within specified tolerances, and the system, when assembled, acquires a production tolerance stack-up that is the result of the cumulative effect of the interaction of the individual tolerances of the components.

"Repeatability" means the ability of an instrument to duplicate the same results each time measurement is made under conditions as close to being identical as possible.

"Road Load" means the loading imposed on a test vehicle, expressed as power measured at the point of contact between the vehicle and the road.

"Short test" means a hot exhaust emissions test of less than five minutes duration.

"Short test cutpoint" means the value as measured by appropriate instruments for each pollutant above which the vehicle fails the short test.

"Span" means adjust the gain of an instrument to a given reading while measuring a calibration parameter under conditions designed to yield that reading. Analyzers should be spanned using calibration gases with concentrations equal to 75 to 100 percent of full scale.

"State of tune" means carburetion, ignition, and emission control system parameter settings (e.g., idle CO, idle rpm, timing, and dwell settings).

"Steady state modal test" means a short test during which undiluted, raw exhaust emission levels are collected and measured continuously while the test vehicle is operated in one or more constant speed (or idle) modes.

"Tolerance" means the range of variation permitted in maintaining a specified dimension during the manufacturing of a product.

"Transient test" means an exhaust emissions test during which exhaust samples are collected under constant volume conditions (variable dilution) while the test vehicle is operated on a dynamometer over a driving schedule consisting of a series of constant rate accelerations, constant rate decelerations, and steady state cruises, with test results reported as mass emissions.

"Vehicle registration weight" means the vehicle weight indicated on the state vehicle registration records.

"Zero" means adjust the output signal on an instrument to obtain a reading of zero while measuring a calibration parameter under conditions designed to yield a zero reading.

§ 85.2203 Abbreviations.

The abbreviations used in this subpart have the following meanings, when used in both capital and lower case:

AC=Alternating Current.
Auto.=Automatic.
C=Celsius.
CEV=Catalyst equipped experimental vehicles.
cfh=Cubic feet per hour.
CFV=Critical flow venturi.
CI=Contingency table correlation index.
CID=Cubic inch displacement.
CO_2=Carbon dioxide.
CO=Carbon monoxide.
Conc.=Concentration.
Cu. in.=Cubic inch(es).
CVS=Constant volume sampler.
E_c=Errors of commission.
Eo=Errors of omission.
EFP=Emission factors program.
EGR=Exhaust—gas recirculation.
F=Fahrenheit.
FF=Correctly failed vehicles.
FID=Flame ionization detector.
FS=Full scale.
ft.=Feet.
FTP=Federal Test Procedure.
FY=Fiscal year.
gm=Grams.
g/mi=Grams per mile.
HC=Hydrocarbon(s).
Hg=Mercury.
Hi.=High.
Hp=Horsepower.
Hr=Hour.
I/M=Inspection/maintenance.
in.=Inches.
km=Kilometers.
km/h=Kilometers per hour.
kPa=Kilopascal(s).
lb.=Pounds.
Lo.=Low.
Max.=Maximum.
in^3/hr=Cubic inches per hour.
Min.=Minute(s).
mph=Miles per hour.
MY=Model year.
NBS=National Bureau of Standards.
NDIR=Nondispersive infrared.
NJ/NY=New Jersey/New York.
NOx=Oxides of nitrogen.
No.=Number.
OMSAPC=Office of Mobile Source Air Pollution Control.
PCV=Positive Crankcase Ventilation.
PDP=Positive displacement pump.
P/F=Pass/fail.
PP=Correctly passed vehicles.
ppm=Parts per million by volume.
psi=Pounds per square inch.
r=Conventional (Pearson) correlation coefficient.
rpm=Revolutions per minute.
Sec.=Seconds.
ST=Short test.
Std.=Standard.
Trans.=Transmission.

§ 85.2204 Overview.

This subpart is divided into three categories:

(a) Test procedures, Emission calculation procedures, Equipment and Equipment Calibration procedures for Transient Tests.

(b) Test procedures, Emission calculation procedures, Equipment and Equipment Calibration procedures for Steady State Modal Tests.

(c) Test procedures, Emission calculation procedures, Equipment and Equipment Calibration procedures for the idle test.

§ 85.2205 Transient test specifications, review.

The transient short tests consist of vehicle operation on a chassis dynamometer over one of two specified driving schedules, during which hydrocarbon, carbon monoxide, and oxides of nitrogen mass emissions are measured. A proportional part of the diluted exhaust emissions is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler (CVS).

§ 85.2206 Transient test procedures, general requirements.

(a) Vehicles shall be tested in the state of adjustment in which they arrive at the test site, with no vehicle preparation or preconditioning of any sort. Vehicles shall be tested at the ambient conditions encountered at the test site. Vehicles shall be approximately level during all phases of the test sequence to prevent abnormal fuel distribution.

(b) Exhaust samples shall be taken from both tailpipes on vehicles having more than one tailpipe exhaust outlet. The samples shall be merged prior to the CVS unit so that a composite sample can be taken. The pollutant concentration levels shall be measured according to the procedures outlined in this subpart and shall be reported as the official test results.

(c) The transient tests follow closely the Federal Test Procedure used for vehicle certification, Subpart B of Part 86 of this chapter. There are several important differences to be noted, however.

(1) The test begins with the vehicle warmed up and idling.

(2) No evaporative emission measurements are made.

(3) Different driving schedules are used.

(4) Actual distance driven is not measured.

§ 85.2207 Federal short cycle test specifications.

(a) Road load power and inertia weight settings shall be determined in accordance with the procedures used for emission certification vehicles outlined in Part 86, Subpart B of this chapter. A compete listing of all possible vehicle/engine configurations must be available at each test site prior to initiation of testing for use in determining appropriate inertia weight and road load power

requirements for each vehicle to be tested.

(b) Transmissions:

(1) Transmissions, overdrives and free wheeling units shall be operated in accordance with the manufacturers' recommendations to the ultimate purchaser as indicated in the owners manual or as supplied by EPA.

(2) Idle modes shall be run with automatic transmissions in "Drive" with the wheels braked and manual transmissions shall be in gear with the clutch disengaged.

(3) The vehicle shall be driven with minimum accelerator pedal movement to maintain the desired speed.

(4) Accelerations shall be driven smoothly according to the manufacturers' recommendations to the ultimate purchaser. For manual transmissions, the operator shall release the accelerator pedal during each shift and accomplish the shift with minimum time. If the vehicle cannot accelerate at the specified rate, the vehicle shall be operated with the accelerator pedal fully depressed until the vehicle speed reaches the value prescribed for that time in the driving schedule.

(5) The deceleration modes shall be run in gear using brakes or accelerator pedal as necessary to maintain the desired speed. Manual transmission vehicles shall have the clutch engaged and shall not change gears from the previous mode. For those modes which decelerate to zero, manual transmission clutches shall be depressed when the speed drops below 15 mph (24 km/h), when engine roughness is evident, or when engine stalling is imminent.

(6) Downshifting is allowed at the beginning of or during a power mode in accordance with the manufacturers' recommendations to the ultimate purchaser.

(c) Dynamometer procedure:

(1) The Federal Short Cycle dynamometer sequence consists of a 125 second long driving schedule consisting of a series of constant rate accelerations, constant rate decelerations, and steady speed cruises. The exhaust emissions are diluted with ambient air and a continuously proportional sample is collected for analysis. The composite samples, collected in bags, are analyzed for hydrocarbons carbon monoxide, carbon dioxide, and oxides of nitrogen. A parallel sample of the dilution air is similarly analyzed for hydrocarbons, carbon monoxide, carbon dioxide, and oxides of nitrogen.

(2) The vehicle engine compartment hood shall remain open for the duration of the Federal Short Cycle. If vehicle overheating occurs (or is anticipated), a cooling fan(s) meeting the specifications in § 85.2212(e) may be used.

(3) The vehicle speed as measured from the dynamometer rolls shall be used. The speed vs. time characteristics of each test shall be checked against the specification to assure test validity.

(4) Practice runs over the prescribed driving schedule may be performed, provided an emission sample is not taken, for the purpose of finding the minimum throttle action to maintain the proper speed-time relationship, or to permit sampling system adjustments.

NOTE.—When using two-roll dynamometers a truer speed-time trace may be obtained by minimizing the rocking of the vehicle on the rolls. The rocking of the vehicle changes the tire rolling radius on each roll. This rocking may be minimized by restraining the vehicle horizontally (or nearly so) by using a cable and winch.

(5) The drive wheels shall be at the pressure prescribed for operation of the vehicle on the road by the tire manufacturer. If the tires are at normal operating temperature (not cold) at the time of testing, the pressure may be 2 to 3 psi above the manufacturers' recommended pressure. The vehicle shall not be tested with underinflated tires.

(6) If the dynamometer has not been operated during the 2-hour period immediately preceding the test it shall be warmed up for 15 minutes by operating at 30 mph (48km/h) using a non-test vehicle or as recommended by the dynamometer manufacturer.

(7) The inertia weight and road load power shall be set to the values determined from § 85.2207(a).

(8) If the engine stalls at any point during the dynamometer run, that test shall be voided. The engine shall then be restarted and run at 2500 rpm ± 200 rpm in neutral for 15 to 30 seconds preceding a retest. This procedure shall be followed until a complete, valid test is run.

(d) Test sequence:

(1) Adjust the dynamometer for the required road load and inertia.

(2) Drive or push test vehicle onto the dynamometer so that wheels are centered on rolls.

(3) Examine vehicle information label to determine group. Record information on test report.

(4) Attach restraining device to vehicle in such a fashion that the vehicle is not damaged. Release dynamometer brake.

(5) With the sample selector valves in the "standby" position connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(6) Start the Constant Volume Sampler (if not already on), the sample pumps and the temperature recorder. The heat exchanger of the constant volume sampler, if used, should be preheated to its operating temperature before the test begins.

(7) Adjust the sample flow rates to the desired flow rate (minimum of 10 cfh, (0.28 m^3/hr)) and set the gas flow measuring devices to zero.

NOTE.—CFV–CVS sample flow rate is fixed by the venturi design.

(8) Attach adaptor(s) and exhaust collection tube(s) to vehicle tailpipe(s).

(9) Attach engine speed pickup.

(10) Idle vehicle in neutral at 2500 ±200 rpm for 15 to 30 seconds within 1 minute of beginning of dynamometer run.

(11) Place transmission in "Drive" or in gear with clutch disengaged.

(12) Turn on driver's aid and begin the initial acceleration of the driving schedule.

(13) Simultaneous with (12), start the gas flow measuring device, position the sample selector valves to direct the sample flow into the exhaust sample bag and dilution air sample bag.

(14) Operate the vehicle according to the following dynamometer driving schedule:

Mode:	*Time in mode (seconds)*
1. 0 to 16 mph (0 to 26 km/h) acceleration	6.0
2. 16 to 29 mph (26 to 47 km/h) acceleration	23.0
3. 29 mph (47 km/h) cruise	10.0
4. 29 to 37 mph (47 to 60 km/h) acceleration	18.0
5. 37 to 42 mph (60 to 68 km/h) acceleration	4.5
6. 42 to 37 mph (68 to 60 km/h) deceleration	2.5
7. 37 to 20 mph (60 to 32 km/h) deceleration	32.0
8. 20 to 0 mph (32 to 0 km/h) deceleration	7.5
9. Idle	21.5
Total	125.0

The speed at any given time on the dynamometer driving schedule must be within the tolerances given in § 86.115–78. The speed tolerance at any given time on the dynamometer driving schedule prescribed above or as printed on a driver's aid chart approved by the Administrator, is defined by upper and lower limits. The upper limit is 2 mph (3.2 km/h) higher than the highest point on the trace within 1 second of the given time. The lower limit is 2 mph (3.2 km/h) lower than the lowest point on the trace within 1 second of the given time. Speed variations greater than the tolerances (such as may occur during gear changes) are acceptable provided they occur for less than 2 seconds on any occasion. Speeds lower than those prescribed are acceptable: *Provided*, The vehicle is operated at maximum available power during such occurrences.

(15) At the end of the driving schedule simultaneously turn off the gas flow measuring device and position the sample selector valve to the "standby" position. This ends the driving portion of the test.

(16) As soon as possible, transfer the exhaust and dilution air samples to the analytical system and process. A stabilized reading for the exhaust sample must be obtained within 20 minutes of the end of the sample collection phase of the test.

(17) Disconnect the engine speed pickup, adaptor(s), exhaust collection tube(s), and restraining device.

(18) Lock dynamometer rolls and drive vehicle off of dynamometer. This ends the test sequence.

(e) Measurement operations. The following sequence of operations shall be performed in conjunction with each series of measurements:

(1) Zero the analyzers and obtain a stable zero reading. Recheck after tests.

(2) Introduce span gases and set instrument gains. In order to avoid corrections, span and calibrate at the same flow rates used to analyze the test sample. Span gases should have concentrations equal to 75 to 100 percent of full scale. If gain has shifted significantly on the analyzers, check the calibrations. Show actual concentrations on chart.

(3) Check zeros; repeat the procedure in paragraphs (1) and (b) of this section if required.

(4) Check flowrates and pressures.

(5) Measure HC, CO, CO_2 and NO_x concentrations of samples.

(6) Check zero and span points. If difference is greater than 2 percent of full scale, repeat the procedure in paragraphs (e) (1) through (5) of this section.

(f) Records required: The following information shall be recorded with respect to each test:

(1) Test number.

(2) Date and time of day for each test.

(3) Instrument operator.

(4) Driver or operator.

(5) Vehicle: Make; Model; Vehicle identification Number; Vehicle registration number and year; Vehicle Model year; Transmission type; Odometer reading; Engine displacement; Idle rpm; Fuel system (fuel injection, number of carburetors, number of carburetor barrels); Inertia loading; Vehicle registration weight; Actual road load at 50 mph (80 km/h); drive wheel tire pressures, as applicable; emission control technology.

(6) All pertinent instrument information such as tuning-gain-serial number-detector number-range. As an alternative, a reference to a test lane number may be used, provided test lane calibration records show the pertinent instrument information.

(7) Recorder charts: Identify zero, span, exhaust gas, and dilution air sample traces.

(8) Test lane barometric pressure, ambient temperature and humidity.

NOTE: A central test site barometer may be used provided that individual test cell barometric pressures are shown to be within ±0.1 percent of the barometric pressure at the central barometer location.

(9) Pressure of the mixture of exhaust and dilution air entering the CVS metering device, the pressure increase across the device, and the temperature at the inlet. The temperature may be recorded continuously or digitally to determine temperature variations.

(10) The number or revolutions of the positive displacement pump accumulated during each test phase while exhaust samples are being collected. The number of standard cubic feet metered by a critical flow of venturi during each test phase would be the equivalent record for a CFV–CVS.

(11) The humidity of the dilution air.

NOTE.: If conditioning columns are not used (see § 86.122 and 86.144) this measurement can be deleted. If the conditioning columns are used and the dilution air is taken from the test cell, the ambient humidity can be used for this measurement.

(g) Test Report. A test report shall be completed in triplicate and shall contain the information given below. One copy shall be given to the vehicle owner or his agent.

(1) Test type and driving schedule.

(2) VIN/License No.

(3) Owner's name and address.

(4) Car make, model, MY, engine size.

(5) Date of test.

(6) Odometer reading.

(7) Date of previous test on vehicle, of retest.

(8) Inertia and road load if applicable.

(9) Test site location, lane identification.

(10) Test results (including emission measurement values).

(11) Certification by instrument operator and driver that test was correctly performed.

§ 85.2208 Federal short cycle test-calculations.

(a) For light duty vehicles and light duty trucks, the mass emissions for each pollutant shall be computed by the following formulae:

(1) Hydrocarbon mass emissions:
$HC_{mass} = V_{mix} \times Density_{HC} \times (HC_{conc.} \times 10^{-6})/L$

(2) Carbon monoxide mass emissions:
$CO_{mass} = V_{mix} \times Density_{CO} \times (CO_{conc.} \times 10^{-6})/L$

(3) Oxides of Nitrogen mass emissions:
$NO_{x_{mass}} = V_{mix} \times Density_{NO_2} \times K_H \times (NO_{x_{conc.}} \times 10^{-6})/L$

(4) Carbon dioxide mass emissions:
$CO_{2_{mass}} = V_{mix} \times Density_{CO_2} \times (CO_{2_{conc.}} \times 10^{-2})/L$

(b) Meaning of symbols

(1) HC_{mass} = Hydrocarbon emissions, in grams per mile.

H = Absolute humidity in grains (grams) of water per pound (kilogram) of dry air.

$H = [(43.478)\, R_a \times P_d]/[P_B - (P_a \times R_a/100)]$ for SI units, $H = [(6.211)\, R_a \times P_d 2/P_H - (P_d \times R_a/100)]$.

R_a = Relative humidity of the ambient air, in percent.

P_d = Saturated vapor pressure, in mm Hg (kPa) at the ambient dry bulb temperature.

P_B = Barometric pressure, in mm Hg (kPa).

V_{mix} = Total dilute exhaust volume in cubic feet per test corrected to standard conditions (538 R) (293 K) and 760 mm Hg (101.3 kPa)).
For PDP–CBS, V_{mix} is:

$$V_{mix} = V_o \times \frac{N(P_B - P_1)(528)\ R)}{(760\ \text{mm Hg})\ (T_p)}$$

for SI units,

$$V_{mix} = V_o \times \frac{N(P_B - P_1)(293.15\ K)}{(101.325\ \text{kPa})\ (T_p)}$$

$Density_{HC}$ = Density of hydrocarbon is 16.33 g/ft³ (.5767 kg/m³), assuming an average carbon to hydrogen ratio of 1:1.85, at 68°F (20°C) and 760 mm Hg (101.3 kPa) pressure.

$HC_{conc.} = HC_e - HC_d\ (1-1/DF)$

Where:

HC_e = Hydrocarbon concentration of the dilute exhaust sample in ppm carbon equivalent.

HC_d = Hydrocarbon concentration of the dilution air as measured, in ppm carbon equivalent.

(2) NOx_{mass} = Oxides of nitrogen emissions, in grams per mile.

$Density_{NO_2}$ = Density of oxides of nitrogen is 54.16 g/ft³ (1.913 kg/m³), assuming they are in the form of nitrogen dioxide, at 68°F (20°C) and 760 mm Hg (101.3 kPa) pressure.

$NO_{conc.}$ = Oxides of nitrogen concentration of the dilution exhaust sample corrected for background, in ppm.

$NOx_{conc.} = NOx_e - NOx_d(1-1/DF)$

Where:

NOx_e = Oxides of nitrogen concentration of the dilute exhaust sample as measured, in ppm.

NOx_d = Oxides of nitrogen concentration of the dilution air as measured, in ppm.

(3) CO_{mass} = Carbon monoxide emissions, in grams per mile.

$Density_{co}$ = Density of carbon monoxide is 32.97 g/ft³, at 68°F (20°C) and 760 mm Hg (101.3 kPa) pressure.

$CO_{conc.}$ = Carbon monoxide concentration of the dilute exhaust sample corrected for background, water vapor, and CO_2 extraction, in ppm.

$CO_{conc.} = CO_e - CO_d(1-1/DF)$.

Where:

CO_e = Carbon monoxide concentration of the dilute exhaust sample volume corrected for water vapor and carbon dioxide extraction, in ppm. The calculation assumes the carbon to hydrogen ratio of the fuel is 1:1.85.

$CO_e = (1-0.01925\ CO_{2e} - 0.000323\ R)\ CO_{em}$

Where:

CO_{em} = Carbon monoxide concentration of the dilute exhaust sample as measured, in ppm.

CO_{2e} = Carbon dioxide concentration of the dilute exhaust sample, in percent.

R = Relative humidity of the dilution air, in percent (see § 86.142(n)).

CO_d = Carbon monoxide concentration of the dilution air corrected for water vapor extraction, in ppm.

$CO_d = (1-0.000322\ R)\ CO_{dm}$.

Where:

CO_{dm} = Carbon monoxide concentration of the dilution air sample as measured, in ppm.

NOTE.—If a CO instrument which meets the criteria specified in § 86.111 is used and the conditioning column has been deleted, CO_{em} can be substituted directly for CO_e and CO_{dm} can be substituted directly for CO_d.

(4) $CO_{2_{mass}}$ = Carbon dioxide emissions, in grams per mile.

Density co_2 = Density of carbon dioxide is 51.85 g/ft³ (1.843 kg/m³), at 68° F (20° C) and 760 mm Hg (101.3 kPa) pressure.

$CO_{2_{conc.}}$ = Carbon dioxide concentration of the dilute exhaust sample corrected for background, in percent.

$CO_{2_{conc.}} = CO_{2_e} - CO_{2_d}$ (1-1/DF).

Where:

CO_{2_d} = Carbon dioxide concentration of the dilution air as measured, in percent.

(5) L = Cycle length, in mi (km)

L = 0.75 mi (0.21 km)

$DF = 13.4/[CO_{2_e} + (HC_e + CO_e)\ 10^{-4}]$

KH = Humidity correction factor.

$KH = 1/[1-0.0047\ (H-75)]$

for SI units $= 1/[1-0.0329\ (H-10.71)]$

Where:

V_o = Volume of gas pumped by the positive displacement pump, in cubic feet (ft³) per revolution. This volume is dependent on the pressure differential across the positive displacement pump.

N = Number of revolutions of the positive displacement pump during the test phase while samples are being collected.

P_B = Barometric pressure, in mm Hg (kPa).

P_A = Pressure depression below atmospheric measured at the inlet to the positive displacement pump, in mm Hg (kPa) (during an idle mode).

T_p = Average temperature of dilute exhaust entering positive displacement pump during test, R(K).

(c) Example calculation of mass values of exhaust emissions using positive displacement pump:

(1) Assume the following:

$V_o = 0.29344$ ft³/revolution; $N = 1{,}048$; $R = 48.0$ pct.; $R_a = 48.2$ pct.; $P_B = 762$ mm Hg; $P_d = 22.225$ mm Hg; $P_A = 70$ mm Hg; $T_p = 570$ R; $HC_e = 105.8$ ppm, carbon equivalent; $NOx_e = 11.2$ ppm; $CO_{em} = 306.6$ ppm; $CO_{2_e} = 1.43$ pct.; $HC_d = 12.1$ ppm; $NOx_d = 0.8$ ppm; $CO_{dm} = 15.3$ ppm.

The basic procedures in § 86.144 are used to calculate mass emissions. Since the short test only has one phase the weighting formula in paragraph (a) of § 86.144 is not used. The mass emission values of paragraph (b) of § 86.144 are divided by the distance traveled, which, for the Federal Short Cycle, is 0.75 mi (1.2 km).

(2) The mass emission results for the Federal Short Cycle example are:

$HC_{mass} = [(259)(16.33)(95.03/1{,}000{,}000)]/(0.75)$.

$HC_{mass} = 0.534$ grams per vehicle mile.

$CO_{mass} = [(259)(32.97)(280/1{,}000{,}000]/(0.75)$.

$CO_{mass} = 3.188$ grams per vehicle mile.

$NOx_{mass} = [(259)(54.16)(10.49/1{,}000{,}000)\ [(0.75)$.

$NOx_{mass} = 0.196$ grams per vehicle mile.

Then:

$V_{mix} = (0.29344)(1{,}048)(762-70)(528)/(760)(570)$.

$V_{mix} = 259.0$ ft³.

$H = (43.478)(48.2)(22.225)/[762-(22.225 \times 48.2/100)]$.

$H = 62$ grams/lb.

$K_H = 1/[1-0.0047(62-75)] = 0.9424$.

$CO_e = [1-(0.01925)(1.43)-(0.000323)(48)](306.0)$

$CO_e = 293.4$ ppm.

$CO_d = [1-(0.000323)(48)]15.3 = 15.1$ ppm.

$DF = 13.4/[1.43 + (105.8 + 293.4) \times 10^{-4})]$

$DF = 9.116$.

$HC_{conc.} = 105.8-12(1-1/9.116) = 95.03$ ppm.

$CO_{conc.} = 293.4-15.1(1-1/9.116) = 280.0$ ppm.

$NOx_{conc.} = 11.2-0.8(1-1/9.116) = 10.49$ ppm.

§ 85.2209 New Jersey/New York Composite test specifications.

(a) *Road load power and inertia weight settings.* All vehicles shall be tested at 3000 lb. inertia weight and 3.5 ± 1 hp @ 30 mph.

(b) *Transmission.* (1) Transmissions, overdrives and free wheeling units shall be operated in accordance with the manufacturers' recommendations to the ultimate purchaser as indicated in the owners manual or as supplied by EPA.

(2) Idle modes shall be run with automatic transmissions in "Drive" with the wheels braked and manual transmissions shall be in gear with the clutch disengaged.

(3) The vehicle shall be driven with minimum accelerator pedal movement to maintain the desired speed.

(4) Accelerations shall be driven smoothly according to the manufacturers' recommendation to the ultimate purchaser. For manual transmissions, the operator shall release the accelerator pedal during each shift and accomplish the shift with minimum time. If the vehicle cannot accelerate at the specified rate, the vehicle shall be operated with the accelerator pedal fully depressed until the vehicle speed reaches the value prescribed for that time in the driving schedule.

(5) The declaration modes shall be run in gear using brakes or accelerator pedal as necessary to maintain the desired speed. Manual transmission vehicles shall have the clutch engaged and shall not change gears from the previous mode. For those modes which decelerate to zero, manual transmission clutches shall be depressed when the speed drops below 15 mph (24 km/h), when engine roughness is evident, or when engine stalling is imminent.

(6) Downshifting is allowed at the beginning of or during a power mode in accordance with the manufacturers' recommendation to the ultimate purchaser.

(c) *Dynamometer procedure.* (1) The New Jersey/New York Composite test consists of a 75 second driving schedule composed of a series of constant rate accelerations, constant rate decelerations, and steady speed cruises. The exhaust emissions are diluted with ambient air and a continuously proportional sample is collected for analysis. The composite samples collected in bags are analyzed for hydrocarbons, carbon monoxide, carbon dioxide, and oxides of nitrogen. A parallel sample of the dilution air is similarly analyzed for hydrocarbon, carbon monoxide, carbon dioxide, and oxides of nitrogen.

(2) The vehicle engine compartment hood shall remain open for the duration of the NJ/NY Composite test. If vehicle overheating occurs (or is anticipated), a cooling fan(s) meeting the specifications set forth in § 85.2212(e) may be used.

(3) The vehicle speed as measured from the dynamometer rolls shall be used. The speed vs. time characteristics of each test shall be checked against the specification to assure test validity.

(4) Practice runs over the prescribed driving schedule may be performed at test points: *Provided,* An emission sample is not taken, for the purpose of finding the minimum throttle action to maintain the proper speed-time relationship, or to permit sampling system adjustments.

NOTE.—When using two-roll dynamometers a truer speed-time trace may be obtained by minimizing the rocking of the vehicle in the rolls. The rocking of the vehicle changes the tire rolling radius on each roll. This rocking may be minimized by restraining the vehicle horizontally (or nearly so) by using a cable and winch.

(5) The drive wheels shall be at the pressure prescribed for operation of the vehicle on the road by the tire manufacturer. If the tires are at normal operating temperature (not cold) at the time of testing, the pressure may be 2 to 3 psi above the manufacturers' recommended pressure. The vehicle shall not be tested with underinflated tires.

(6) If the dynamometer has not been operated during the 2-hour period immediately preceding the test it shall be warmed up for 15 minutes by operating at 30 mph (48 km/h) using a non-test vehicle or as recommended by the dynamometer manufacturer.

(7) The inertia weight and road load power shall be set at 3000 lb. and 3.5±1 hp at 30 mph prior to testing.

(8) If the engine stalls at any point during the dynamometer run, that test shall be voided. The engine shall then be restarted and run at 2500 rpm ± 200 rpm in neutral for 15 to 30 seconds preceding a retest. This procedure shall be followed until a complete, valid test is run.

(d) *Test sequence.* (1) Adjust the dynamometer for the required road load and inertia.

(2) Drive or push test vehicle onto the dynamometer so that wheels are centered on rolls.

(3) Examine emission control information label to determine engine family and displacement. Record information on test report.

(4) Attach restraining device to vehicle in such a fashion that the vehicle is not damaged. Release dyno brake.

(5) With the sample selector valves in the "standby" position connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(6) Start the Constant Volume Sampler (if not already on), the sample pumps, the temperature recorder and the vehicle cooling fan. The heat exchanger of the constant volume sampler, if used, should be preheated to its operating temperature before the test begins.

(7) Adjust the sample flow rates to the desired flow rate (minimum of 10 cfh,

0.28 m³/hr) and set the gas flow measuring devices to zero.

NOTE.—CFV–CVS sampler flow rate is fixed by the venturi design.

(8) Attach adaptor(s) and exhaust collection tube(s) to vehicle tailpipe(s) (engine may be shutoff, if necessary).

(9) Attach engine speed pickup.

(10) Idle vehicle in neutral at 2,500 ±200 rpm for 15 to 30 seconds within 1 minute of beginning of dynamometer run.

(11) Place transmission in "Drive" or in gear with clutch disengaged.

(12) Start the gas flow measuring device, position the sample selector valves to direct the sample flow into the exhaust sample bag and the dilution air sample bag.

(13) Simultaneous with (12), turn on driver's aid and begin the initial acceleration of the driving schedule.

(14) Operate the vehicle according to the following dynamometer driving schedule:

Mode:	Times in mode (seconds)
1. Idle	22
2. 0–30 mph (0–48 km/hr) acceleration	15
3. 30 mph (48 km/hr) cruise	15
4. 30–10 mph (48–16 km/hr) deceleration	12
5. 10 mph (16 km/hr) cruise	7
6. 10–0 mph (16–0 km/hr) deceleration	4
Total	75

The speed at any given time on the dynamometer driving schedule must be within the tolerances given in § 86.115–78.

(15) At the end of the driving schedule, simultaneously turn off the gas flow measuring device and position the sample selector valve to the "standby" position. This ends the driving portion of the test.

(16) As soon as possible, tranfer the exhaust and dilution air samples to the analytical system and process them. A stabilized reading for the exhaust sample must be obtained within 20 minutes of the end of the sample collection phase of the test.

(17) Disconnect the engine speed pickup, adaptor(s), exhaust collection tube(s), and restraining device.

(18) Lock the dynamometer rolls and drive the vehicle off the dynamometer. This ends the test sequence.

(e) *Measurement operations.* The following sequence of operations shall be performed in conjunction with each service measurements:

(1) Zero the analyzers and obtain a stable zero reading. Recheck after tests.

(2) Introduce span gases and set instrument gains. In order to avoid corrections, span and calibrate at the same flow rates used to analyze the test sample. Span gases should have concentrations equal to 75 to 100 percent of full scale. If gain has shifted significantly on the analyzers, check the calibrations. Show actual concentrations on chart.

(3) Check zeros; repeat the procedure in paragraphs (e) (1) and (2) of this section if required.

(4) Check flow rates and pressures.

(5) Measure HC, CO, CO_2, and NOx concentrations of samples.

(6) Check zero and span points. If difference is greater than 2 percent of full scale, repeat the procedure in paragraphs (e) (1) through (5) of this section.

(f) *Records required.* The following information shall be recorded with respect to each test:

(1) Test number.

(2) Date and time of day for each test.

(3) Instrument operator.

(4) Driver or operator.

(5) Vehicle: Make; Model; Vehicle identification Number; Vehicle registration number and year; Vehicle Model year; Transmission type; Odometer reading; Engine displacement; Idle rpm; Fuel system (fuel injection, number of carburetors, number of carburetor barrels); Inertia loading; Vehicle registration weight; Actual road load at 50 mph (80 km/h); drive wheel tire pressures, as applicable; emission control technology.

(6) All pertinent instrument information such as tuning-gain-serial number-detector number-range. As an alternative, a reference to a vehicle test cell number may be used, with the advance approval of the EPA, provided test cell calibration records show the pertinent instrument information.

(7) Recorder charts: Identify zero, span, exhaust gas, and dilution air sample traces.

(8) Test cell barometric pressure, ambient temperature and humidity.

NOTE.—A central laboratory barometer may be used: *Provided*, That individual test cell barometric pressures are shown to be within ±0.1 percent of the barometric pressure at the central barometer location.

(9) Fuel temperatures, as prescribed.

(10) Pressure of the mixture of exhaust and dilution air entering the CVS metering device, the pressure increase across the device, and the temperature at the inlet. The temperature may be recorded continuously or digitally to determine temperature variations.

(11) The number of revolutions of the positive displacement pump accumulated during each test phase while exhaust samples are being collected. The number of standard cubic feet metered by a critical flow venturi during each test phase would be the equivalent record for a CFV–CVS.

(12) The humidity of the dilution air.

NOTE.—If conditioning columns are not used (see § 86.111–78) this measurement can be deleted. If the conditioning columns are used and the dilution air is taken from the test cell, the ambient humidity can be used for this measurement.

(g) *Test report.* A test report shall be completed in triplicate on a form approved by EPA and shall contain the information given below. One copy of this report should be given to the vehicle owner or his agent.

(1) Test type and driving schedule.

(2) VIN/License No.

(3) Owner's name and address.

(4) Car make, model, MY, engine size.

(5) Date of test.

(6) Odometer reading.

(7) Date of previous test on vehicle, if retest.

(8) Inertia and road load if applicable.

(9) Test site location, lane identification.

(10) Test results (including emission measurement values).

(11) Certification by instrument operator and driver that test was correctly performed.

§ 85.2210 New Jersey/New York composite test—calculations.

(a) For light duty vehicles and light duty trucks the mass emissions for each pollutant shall be computed by the following formulae:

(1) Hydrocarbon mass emissions:

$$HC_{mass} = V_{mix} \times Density_{HC} \times (HC_{conc.} \times 10^{-4})/L.$$

(2) Carbon monoxide mass emissions:

$$CO_{mass} = V_{mix} \times Density_{CO} \times (CO_{conc.} \times 10^{-4})/L.$$

(3) Oxides of Nitrogen mass emissions:

$$NOx_{mass} = V_{mix} \times Density_{NO_2} \times K_H \times (NOx_{conc.} \times 10^{-4})/L.$$

(4) Carbon dioxide mass emissions:

$$CO_{2_{mass}} = V_{mix} \times Density_{CO_2} \times (CO_{2_{conc.}} \times 10^{-2})/L.$$

(b) Meaning of symbols

(1) HC_{mass} = Hydrocarbon emissions, in grams per mile.

$Density_{HC}$ = Density of hydrocarbon is 16.33 g/ft³ (.5767 kg/m³), assuming an average carbon to hydrogen ratio of 1:1.85, at 68°F (20°C) and 760 mm Hg (101.3 kPa) pressure.

$HC_{conc.} = HC_e - HC_d\ (1-1/DF)$.

Where:

HC_e = Hydrocarbon concentration of the dilute exhaust sample in ppm carbon equivalent.

HC_d = Hydrocarbon concentration of the dilution air as measured, in ppm carbon equivalent.

(2) NOx_{mass} = Oxides of nitrogen emissions, in grams per mile.

$Density_{NO_2}$ = Density of oxides of nitrogen is 54.16 g/ft³ (1.913 kg/m³), assuming they are in the form of nitrogen dioxide, at 68°F (20°C) and 760 mm Hg (101.3 kPa) pressure.

$NO_{conc.}$ = Oxides of nitrogen concentration of the dilute exhaust sample corrected for background, in ppm.

$NOx_{conc.} = NOx_e - NOx_d(1-1/DF)$.

Where:

NOx_e = Oxides of nitrogen concentration of the dilute exhaust sample as measured, in ppm.

NOx_d = Oxides of nitrogen concentration of the dilute air as measured, in ppm.

(3) CO_{mass} = Carbon monoxide emissions, in grams per mile.

$Density_{CO}$ = Density of carbon monoxide is 32.97 g/ft³), at 68°F (20°C) and 760 mm Hg (101.3 kPa) pressure.

$CO_{conc.}$ = Carbon monoxide concentration of the dilute exhaust sample corrected for background, water vapor, and CO_2 extraction, in ppm.

$CO_{conc.} = CO_e - CO_d\ (1-1/DF)$.

Where:

CO_c = Carbon monoxide concentration of the dilute exhaust sample volume corrected for water vapor and carbon dioxide extraction, in ppm. The calculation assumes the carbon to hydrogen ratio of the fuel is 1:1.85.

$CO_c = (1-0.01925\ CO_{2_c} - 0.000323\ R)\ CO_m$.

Where:

CO_m = Carbon monoxide concentration of the dilute exhaust sample as measured, in ppm.

CO_{2_c} = Carbon dioxide concentration of the dilute exhaust sample, in percent.

R = Relative humidity of the dilution air, in percent (see § 86.142(n)).

CO_d = Carbon monoxide concentration of the dilution air corrected for water vapor extraction, in ppm.

$CO_d = (1-0.000322\ R)\ CO_{d_m}$.

Where:

CO_{d_m} = Carbon monoxide concentration of dilution air sample as measured, in ppm.

NOTE.—If a CO instrument which meets the criteria specified in § 86.111 is used and the conditioning column has been deleted, CO_m can be substituted directly for CO_c and CO_{d_m} can be substituted directly for CO_d.

(4) $CO_{2_{mass}}$ = Carbon dioxide emissions, in grams per mile.

Density $_{CO_2}$ = Density of carbon dioxide is 51.85 g/ft³ (1.843 kg/m³), at 68° F (20° C) and 760 mm Hg (101.3 kPa) pressure

$CO_{2_{conc.}}$ = Carbon dioxide concentration of the dilute exhaust sample corrected for background, in percent.

$CO_{2_{conc.}} = CO_{2_c} - CO_{2_d}(1-1/DF)$.

Where:

CO_{2_d} = Carbon dioxide concentration of the dilution air as measured, in percent.

(5) L = Cycle length, in mi (km).

L = 0.28 mi (0.45 km).

$DF = 13.4/[CO_{2_c} + (HC_c + CO_c)\ 10^{-4}]$.

KH = Humidity correction factor.

$KH = 1/[1-0.0047(H-75)]$ for *SI* units = $1/[1-0.0329(H-10.71)]$.

Where:

H = Absolute humidity in grains (grams) of water per pound (kilogram) of dry air.

$H = [(43.478)\ R_c \times P_d]/[P_B - (P_c \times R_c/100)]$ for *SI* units, $H = (6.211)\ R_c \times P_d 2/P_B - (P_d \times R_c/100)]$.

R_c = Relative humidity of the ambient air, in percent.

P_d = Saturated vapor pressure, in mm Hg (kPa) at the ambient dry bulb temperature.

P_B = Barometric pressure, in mm Hg (kPa).

V_{mix} = Total dilute exhaust volume in cubic feet per test corrected to standard conditions (538 *B*) (293 *K*) and 760 mm Hg (101.3 kPa)).

For PDP-CVS, V_{MIX} is:

$$V_{mix} = V_o \times \frac{N(P_B - P_1)(528R)}{(760\text{ mm Hg})(T_p)}$$

for *SI* units,

$$V_{mix} = V_o \times \frac{N(P_B - P_1)(293.15K)}{(101.325\text{ kPa})(T_p)}$$

Where:

V_o = Volume of gas pumped by the positive displacement pump, in cubic feet (m³) per revolution. This volume is dependent on the pressure differential across the positive displacement pump.

N = Number of revolutions of the positive displacement pump during the test phase while samples are being collected.

P_B = Barometric pressure, in mm Hg (kPa).

P_1 = Pressure depression below atmospheric measured at the inlet to the positive displacement pump, in mm Hg (kPa) (during an idle mode).

T_p = Average temperature of dilute exhaust entering positive displacement pump during test, *R(K)*.

(c) Example calculation of mass values of exhaust emissions using positive displacement pump:

(1) Assume the following:

V_o = 0.29344 ft³/revolution; N = 1,048; R = 48.0 pct.; R_c = 48.2 pct.; P_B = 762 mm Hg; P_d = 22.225 mm Hg; P_1 = 70 mm Hg; T_p = 570 R; HC_c = 105.8 ppm, carbon equivalent; NOx_c = 11.2 ppm; CO_m = 306.6 ppm; CO_{2_c} = 1.43 pct. HC_d = 12.1 ppm; NOx_d = 0.8ppm; CO_{d_m} = 15.3 ppm.

The basic procedures in § 86.144 are used to calculate mass emissions. Since the short test only has one phase the weighting formula in paragraph (a) of § 86.144 is not used. The mass emission values of paragraph (b) of § 86.144 are divided by the distance traveled, which, for the NJ/NY Composite test, is 0.28 mi (0.45 km).

Then:

$V_{mix} = (0.29344)(1,048)(762-70)(528)/(760)(570)$.

$V_{mix} = 259.0$ ft³.

$H = (43.478)(48.2)(22.225)/[762-(22.225 \times 48.2/100)]$.

$H = 62$ grams/lb.

$K_H = 1/[1-0.0047(62-75)] = 0.9424$.

$CO_c = [1-(0.01925)(1.43)-(0.000323)(48)](306.0)$.

$CO_c = 293.4$ ppm.

$CO_d = [1-(0.000323)(48)]15.3 = 15.1$ ppm.

$DF = 13.4/[1.43 + (105.8 + 293.4) \times 10^{-4})]$.

$DF = 9.116$.

$HC_{conc.} = 105.8 - 12(1-1/9.116) = 95.03$ ppm.

$CO_{conc.} = 293.4 - 15.1(1-1/9.116) = 280.0$ ppm.

$NOx_{conc.} = 11.2 - 0.8(1-1/9.116) = 10.49$ ppm.

(2) The mass emission results for the NJ/NY Composite test example are:

$HC_{mass} = [(259)(16.33)(95.03/1,000,000)]/(0.28)$.

$HC_{mass} = 1.435$ grams per vehicle mile.

$CO_{mass} = [(259)(32.97)(280/1,000,000)]/(0.28)$.

$CO_{mass} = 8.539$ grams per vehicle mile.

$NOx_{mass} = [(259)(54.16)(10.49/1,000,-000)](0.28)$.

$NOx_{mass} = 0.525$ grams per vehicle mile.

§ 85.2211 [Reserved]

§ 85.2212 Dynamometer systems.

(a) *Dynamometer for Federal Short Cycle test.* (1) The dynamometer used for the Federal Short Cycle test shall be equipped with preselectable loads and inertia weights for the vehicles to be tested.

(2) The chassis dynamometer for the Federal Short Cycle test shall be capable of a minimum of 50 horsepower load absorption at 50 MPH repeatable to ±0.25 horsepower without control adjustment. Torque measurement signals shall be accurate to ±0.25 percent of full scale. Instrumentation shall be readable from the vehicle drivers seat and shall have readout accuracies within 1 percent of full scale for vehicle speed, engine RPM, torque and horsepower.

(3) The dynamometer to be used for the Federal Short Cycle test shall require inertia simulation loading from 1750 to 6000 pounds with automatic road load selections (horsepower and inertia) at 12 settings (from 1750 to 6000 pounds) that are in agreement with the specifications of § 86.129. The controls for the road load system should be capable of being interfaced with those for the variable inertia or being separated for individual load and inertia controls. An additional remote control device should be provided for the driver to set the dynamometer load when operating under separate load and inertia controls.

(b) *Dynamometer for NJ/NY Composite test.* The dynamometer used for the composite NJ/NY test shall be capable of setting a 3.5 HP load setting @ 30 mph with a 3000 lb inertia weight.

(c) *Vehicle restrainnig.* A vehicle restraining device is necessary to hold the vehicle on the dynamometer rolls effectively for both rear and front wheel drive vehicles.

(d) *Driver's aid.* A drivers aid device relating vehicle speed in MPH to time of test shall be used for variable speed mode tests as in paragraphs (a) and (b) of this section. While it is preferable to use preprinted or computer-drawn charts approved by the administrator for purposes of record keeping and driver test validity, computer-controlled oscilloscopes or digital readout devices can be employed for directing drivers but should be provided with a test validity check so that the speed-time tolerances are met as specified in § 86.115-78(b).

(e) *Cooling fan.* Cooling fan(s) are not normally needed for the short tests but some vehicles, when the ambient temperature exceeds 95° F, tend to overheat. In these cases it is permissible to use an engine cooling fan normally rated at 5300 CFM. The fan must have been certified for its capacity by the fan manufacturers and positioned as outlined in § 86.135-78(b).

(f) *RPM meter.* The engine rpm meter shall be AC powered and provided with an induction type pickup so that no tools will be needed for attachment to the ignition system.

§ 85.2213 Exhaust gas sampling system.

(a) *General.* The exhaust gas sampling systems used in the Federal Short Cycle Test and the composite New Jer-

sey/New York Test are identical. The Federal Short Cycle Test and the composite New Jersey/New York Test employ Variable Speed Modes. Density of sampling systems to be used in these tests are designed to measure the true mass emissions of vehicles.

(b) *Mass Emission Exhaust Sampling Systems.* The requirements are identical to those described in § 86.109–78(a) and the component descriptions in § 86.109–78 (b) and (c).

§ 85.2214 Calibration procedures for transient mode tests.

(a) *Calibration of dynamometer.* The dynamometer system for transient mode tests shall be calibrated in accordance with the manufacturers basic instructions and then with the procedure outlined in § 86.118–78. The following conditions shall constitute an acceptable calibration of the system components.

(1) Four or more data points shall be measured that adequately span the horsepower range of the vehicles to be tested on the dynamometer.

(2) The minimum range covered by the data points shall be 20 horsepower.

(b) *Calibration of driver's aid.* The drivers aid device shall be calibrated for time and speed accuracy as follows:

(1) The calibration of the unit for time shall be performed using a timer with an accuracy of ±0.1 second in 60 minutes to measure the total time for the travel of the preprinted chart or computer actuated trace and the accuracy at any point shall be within ±0.2 second. The measurement shall be repeated with adjustments as needed until the accuracy is attained.

(2) The speed indication shall be calibrated by measuring the relationship between the RPM of the rolls and the readout in mph of the recorder. The relationship is expressed by the formula, $\text{mph}=\frac{\text{RPM}\times\Pi\times\text{D}}{1056}$ where D equals roll diameter in inches and mph is determined to one significant decimal place.

(3) The calibration shall be performed with the use of a precision tachometer (accuracy=±1 percent F.S. or better) to determine the RPM of the roll normally connected to the system tachometer. One reading shall be taken at 1800 rpm roll speed and a second reading 900 RPM roll speed in order to establish linearity of the system. Perform any adjustments needed to make MPH indicator of system read accurately at zero and the two points represented above.

(4) After this calibration, the system MPH meter can be used to calibrate the speed (MPH) portion of the Driver's aid recorder.

(c) *Calibration of CVS.* The requirements are identical to those described in § 86.119–78.

(d) *Calibration of HC Analyzer.* The requirements are identical to those described in § 86.121–78.

(e) *Calibration of CO Analyzer.* The requirements are identical to those described in § 86.122–78.

(f) *Calibration of NO_x Analyzer.* The requirements are identical to those described in § 86.123–78.

(g) *Calibration of CO_2 Analyzer.* The requirements are identical to those described in § 86.124–78.

(h) *Calibration of Other Equipment.* The requirements are identical to those described in § 86.126–78.

(i) *Frequency of analyzer calibrations.* The requirements are identical to those described in § 86.116–78(c)(1)(3), (d)(1)(2), (e), (f).

(j) *Frequency of dynamometer calibration.* The frequency of dynamometer calibration and the associated equipment used for testing shall, in general, be performed as often as required by the individual manufacturers of the equipment. In order to insure good standards of performance, however, both vehicle conformance checks and quality control calibrations should be performed as follows:

(1) Cross checks shall be made weekly on dynamometer systems using a vehicle with uniform or repeatable emissions to find the correlation between dynamometers and establish an acceptable degree of uniformity. Of necessity, this final emission test involves individual calibrations of the CVS (§ 85.2214–(c)) and the analytical instruments (§ 85.2214–(d) through (g)) in addition to the chassis dynamometer calibration. A desirable alternative method is to use a vehicle with repeatable emissions that has been equipped with analytical instruments and calibration gases, thereby reducing the unknowns to the CVS and chassis dynamometer.

(2) The dynamometer system shall be calibrated at least monthly according to paragraph (a) of this section unless dynamometer maintenance has been performed which could alter the calibration. In that case, or if performance cross checks show deterioration, the calibration should be made as soon as possible.

(k) *Frequency of calibration of other equipment.* Other test equipment shall be calibrated as often as required by the manufacturer or as necessary according to good engineering practice.

§ 85.2215 [Reserved]

§ 85.2216 Steady state modal test specifications, overview.

The steady state modal exhaust emission short test consists of vehicle operation over 3 steady state modes during which undiluted exhaust samples are analyzed for hydrocarbon, carbon monoxide and oxides of nitrogen.

§ 85.2217 Steady state modal test procedures, general requirements.

(a) Vehicles shall be tested in the configuration in which they arrive at the test site, with no preconditioning or vehicle preparation. Vehicles shall be tested at the ambient temperatures encountered at the test sites. Vehicles shall be approximately level during the test sequence to prevent abnormal fuel distribution.

(b) Exhaust samples shall be taken from both tailpipes on vehicles having more than one tailpipe exhaust outlet. The pollutant concentration level shall be measured for exhaust samples from each tailpipe according to the procedures outlined in this subpart and then the average emission level of the two tailpipe exhaust samples shall be reported as the official test results.

§ 85.2218 Clayton Key Mode test specifications.[1]

(a) Transmission ranges, speed ranges, and road load power settings. Transmission ranges, speed ranges, and road load power settings shall be determined according to the following schedule:

Vehicle weight class (lb)	Transmission, range/gear	Dyno load hp at mph	High-speed cruise	Low-speed cruise	Idle [1]
Up to 2,800 lb	Drive for auto trans; high gear (3d) for manual trans.	15 at 38	36 to 38	22 to 25	Automatic transmission in drive.
2,801 to 3,800 lb	Drive for auto trans; high gear for manual trans.	24 at 49	44 to 46	29 to 32	Do.
3,801 lb and up	do	30 at 50	48 to 50	32 to 35	Do.

[1] Tests in which the idle speed is not within ±100 rpm of manufacturers specification shall be declared invalid.

(b) Test weights. A complete listing of all vehicle/engine displacement combinations and their respective inertia test weights must be available at each test site prior to initiation of testing.

(c) Dynamometer procedure: (1) During the steady state exhaust emission test, the raw exhaust is collected via a sample probe(s) (as described in § 85.2222(m)) inserted directly into the vehicle tailpipe(s). The undiluted exhaust is analyzed continuously while the vehicle is run on the dynamometer in three steady state modes, and the emission levels are monitored and recorded upon stabilization of readings. Pollutant emission levels are read and reported as volumetric concentrations, expressed in parts per million of hydrocarbons and oxide of nitrogen and in percent (by volume) for carbon monoxide.

(2) Under normal test conditions, and normal vehicle operation, no cooling fan shall be in use. The vehicle engine compartment hood shall remain open during the dynamometer run. However, if problems with vehicle overheating are encountered or anticipated, a cooling fan(s) meeting the requirements set forth in § 86.135–78(b) may be used.

(3) The vehicle speed as measured from the dynamometer rolls shall be

[1] Clayton Key Mode is a proprietary procedure for which a patent has been applied for by the Clayton Manufacturing Company, which company has stated that it will charge fees for the use of this test procedure.

used for speed determination during the high speed and low speed modes. The speed of each test shall be checked against the specification to assure test validity.

(4) Rocking of the test-vehicle on a two-roll dynamometer shall be minimized by restraining the vehicle horizontally (or nearly so) by using a cable and winch restraining device.

(5) The drive wheels shall be at the pressure prescribed for operation of the vehicle on the road by the tire manufacturer. If the tires are at normal operating temperature (not cold) at the time of testing, the pressure may be 2 to 3 psi above the manufacturers' recommended pressure. The vehicle shall not be tested with underinflated tires.

(6) If the dynamometer has not been operated during the 2 hour period immediately preceding the test, it shall be warmed up for 15 minutes at 30 mph using a non-test vehicle or as recommended by the manufacturer.

(7) If the engine stalls at anytime during one of the steady-state tests, the engine shall be restarted and idled at 2,500±200 rpm for 15–30 seconds and the test resumed at the point of the stall.

(d) Test sequence: (1) Drive or push test vehicle onto the dynamometer so that drive wheels are centered on rolls.

(2) Attach restraining device to vehicle in such a fashion that the vehicle is not damaged.

(3) Open engine compartment and attach engine speed pickup.

(4) Insert sample probe(s) into tailpipe(s).

(5) Examine emission control information label to determine engine family and displacement. Record information on test report.

(6) Adjust dynamometer for the required road load.

(7) Calibrate analyzers according to § 85.2223(c) within 1 hour of the beginning of each test.

(8) Idle vehicle in neutral at 2500± 200 rpm for 15 to 30 seconds within 1 minute of start of each test.

(9) Run test vehicle in high speed mode until emission levels stabilize or for a maximum of 2 minutes.

(10) Record concentration of HC, CO, and NOx upon stabilization or record the highest reading obtained during the last 30 seconds of the 2 minute test period.

(11) Run vehicle in low speed mode until emission levels stabilize or for a maximum of 2 minutes.

(12) Record concentrations of HC, CO, and NOx upon stabilization or record the highest reading reached during the final 30 seconds of the 2 minute test period.

(13) Idle vehicle in drive until emission levels stabilize or for a maximum of 2 minutes.

(14) Record concentrations of HC, CO, and NOx upon stabilization or record the highest reading reached during the last 30 seconds of the 2 minute sampling periods.

(15) Remove sample probe(s).

(16) Remove engine speed pickup and close engine compartment.

(17) Release restraining device.

(18) Lock dynamometer rolls.

(19) Drive vehicle off of dynamometer.

(e) Record required: The following information shall be recorded with respect to each test:

(1) Test number.

(2) Date and time of day for each test.

(3) Instrument operator.

(4) Driver or operator.

(5) Vehicle: Make; Model; Vehicle identification number; Model year; vehicle registration number and year; Transmission type; Odometer reading; Engine displacement; Idle rpm; Fuel system (fuel injection, number of carburetors, number of carburetor barrels); Inertia loading; vehicle registration weight; Actual road load at 50 mph (80 km/h); drive wheel tire pressure, and applicable emission control technology.

(6) All pertinent instrument information such as tunning; gain; serial number; detector number; range. As an alternative, a reference to a vehicle test lane number may be used, with the advance approval of the Administrator, provided test lane calibration records show the pertinent instrument information.

(7) Recorder charts: Identify zero, span, exhaust gas, and dilution air sample traces.

(8) Test cell barometric pressure, ambient temperature and humidity.

NOTE: A central inspection station barometer may be used: *Provided*, That individual test lane barometric pressures are shown to be within ±0.1 percent of the barometric pressure at the central barometer location.

(9) Readings obtained during each of the three test modes shall be the final reported emission levels, expressed in ppm for HC and NOx with CO expressed in percent by volume.

(f) Test report: A test report shall be completed in triplicate on a form approved by EPA and shall contain the following information. One copy shall be given to the vehicle owner or his agent.

(1) Test type and driving schedule.

(2) VIN/License No.

(3) Owner's name and address.

(4) Car make, model, MY, engine size, group.

(5) Date of test.

(6) Odometer reading.

(7) Date of previous test on vehicle, if retest.

(8) Inertia and road load if applicable.

(9) Test site location, lane identification.

(10) Test results (including emission measurement values).

(11) Certification by instrument operation and driver that test was correctly performed.

§ 85.2219 Federal Three Mode test specifications.

(a) Transmission ranges, speed ranges, and road load power settings. Transmission ranges, speed ranges, and road load power settings shall be determined according to the following schedule:

Vehicle weight class (lb)	Transmission range	High-speed mode		Low-speed mode		Idle mode [1]
		Speed (mph)	Load (hp)	Speed (mph)	Load (hp)	
Up to 2,500 lb	Drive for auto trans; high (3d) gear for manual trans.	50	21	30	9	Automatic transmission in neutral.
2,501 to 3,500 lb	Drive for auto trans; high gear for manual trans.	50	26	30	12	Do.
3,501 to 4,500 lb	do	50	31	30	15	Do.
Above 4,501 lb	do	50	36	30	18	Do.

[1] Test in which the idle speed is not within ±100 rpm of manufacturer's specification shall be declared invalid.

(b) Test weights. A complete listing of all vehicle/engine displacement combinations and their respective inertia test weights shall be provided to each test site prior to initiation of testing.

(c) Dynamometer procedure:

(1) During the steady state exhaust emission test, the raw exhaust is collected via a sample probe(s) (as described in § 85.2222(m)) inserted directly into the vehicle tailpipe(s). The undiluted exhaust is analyzed continuously while the vehicle is run on the dynamometer in three steady state modes, and the emission levels are monitored and recorded upon stabilization of readings. Pollutant emission levels are read and reported as volumetric concentrations, expressed in parts per million of hydrocarbons and oxides of nitrogen and in percent (by volume) for carbon monoxide.

(2) Under normal test conditions, and normal vehicle operation, no cooling fan shall be in-use. The vehicle engine compartment hood shall remain open during the dynamometer run. However, if problems with vehicle overheating are encountered or anticipated, a cooling fan(s) meeting the requirements set forth in § 86.135–78(b) may be used.

(3) The vehicle speed as measured from the dynamometer rolls shall be used for speed determination during the high speed and low speed modes. The speed of each test shall be checked against the specification to assure test validity.

(4) Rocking of the test vehicle on a two-roll dynamometer shall be minimized by restraining the vehicle horizontally (or nearly so) by using cable and winch.

(5) The drive wheels shall be at the pressure prescribed for operation of the vehicle on the road by the tire manufacturer. If the tires are at normal operating temperature (not cold) at the time of testing, the pressure may be 2 to 3 psi

above the manufacturers' recommended pressure. The vehicle shall not be tested with underinflated tires.

(6) If the dynamometer has not been operated during the 2 hour period immediately preceding the test, it shall be warmed up for 15 minutes at 30 mph using a non-test vehicle or as recommended by the manufacturer.

(7) If the engine stalls at anytime during one of the steady state tests, the engine shall be restarted and idled at 2500 ± 200 rpm for 15–30 seconds and the test resumed at the point of the stall.

(d) Test sequence: (1) Drive or push test vehicle onto the dynamometer so that drive wheels are centered on rolls.

(2) Attach restraining device to vehicle in such a fashion that the vehicle is not damaged.

(3) Open engine compartment and attach engine speed pickup.

(4) Insert sample probe(s) into tailpipe(s).

(5) Examine emission control information label to determine engine family and displacement. Record information on test report.

(6) Adjust dynamometer for the required road load.

(7) Calibrate analyzers according to § 85.2223(c) within 1 hour of the beginning of each test.

(8) Idle vehicle in neutral at 2,500± 200 rpm for 15 to 30 seconds within 1 minute of start of each test.

(9) Run test vehicle in high speed mode until emission levels stabilize or for a maximum of 2 minutes.

(10) Record concentration of HC, CO, and NOx upon stabilization or record the highest reading obtained during the last 30 seconds of the 2 minute test period.

(11) Run vehicle in low speed mode until emissions levels stabilize or for a maximum of 2 minutes.

(12) Record concentrations of HC, CO, and NO_x upon stabilization or record the highest reading reached during the final 30 seconds of the 2 minute test period.

(13) Idle vehicle in neutral until emission levels stabilize or for a maximum of 2 minutes.

(14) Record concentrations of HC, CO, and NO_x upon stabilization or record the highest reading reached during the last 30 seconds of the 2 minutes sampling period.

(15) Remove sample probe(s).

(16) Remove engine speed pickup and close engine compartment.

(17) Release restraining device.

(18) Lock dynamometer rolls.

(19) Drive vehicle off of dynamometer.

(e) Records required: The following information shall be recorded with respect to each test:

(1) Test number.

(2) Date and time of day for each test.

(3) Instrument operator.

(4) Driver or operator.

(5) Vehicle: Make; model; vehicle identification number; model year; vehicle registration number and year; transmission type; odometer reading; engine displacement; idle rpm; fuel system (fuel injection, number of carburetors, number of carburetor barrels); inertia loading; vehicle registration weight; actual road load at 50 mph (80 km/h); drive wheel tire pressure, as applicable; emission control technology.

(6) All pertinent instrument information such as tuning; gain; serial number; detector number; range. As an alternative, a reference to a vehicle test lane number may be used, with the advance approval of the Administrator, provided test lane calibration records show the pertinent instrument information.

(7) Recorder charts: Identify zero, span, exhaust gas, and dilution air sample traces.

(8) Test cell barometric pressure, ambient temperature and humidity.

NOTE.—A central laboratory barometer may be used: *Provided*, That individual test cell barometric pressures are shown to be within ±0.1 percent of the barometric pressure at the central barometer location.

(9) Readings obtained during each of the three test modes shall be the final reported emission levels, expressed in ppm for HC and NOx with CO expressed in percent by volume.

(f) Test report: A test report shall be completed in triplicate on a form approved by EPA and shall contain the following information. One copy shall be given to the vehicle owner or his agent.

(1) Test type and driving schedule.

(2) VIN/License No.

(3) Owner's name and address.

(4) Car make, model, MY, engine size.

(5) Date of test.

(6) Odometer reading.

(7) Date of previous test on vehicle, if retest.

(8) Inertia and road load if applicable.

(9) Test site location, lane identification.

(10) Test results (including emission measurement values).

(11) Certification by instrument operation and driver that test was correctly performed.

§ 85.2220 Equipment specifications—steady state modal tests.

Equipment which is equivalent in all material respects to that described in §§ 85.2211 to 85.2214 may be used for steady state short tests. However, equipment described in §§ 85.2221 and 85.2222 may also be used.

§ 85.2221 Dynamometer System.

(a) *General requirements.* Steady state tests such as the Federal Three Mode and the Key Mode require a dynamometer with a power absorption unit but no inertia simulation. The same type of dynamometer specified in § 85.2212(a) can be used with the inertia assembly disengaged.

(b) *Road load power settings.* Road load power for the dynamometer shall be set according to the individual test requirements.

(c) *Dynamometer tolerance requirements.* The chassis dynamometer used for steady state tests shall be capable of a minimum of 50 HP load absorption at 50 MPH that is repeatable to ±0.25 HP without control readjustment. Torque measurement signals shall be accurate to ±0.25% of full scale. Instrumentation shall be readable from the vehicle drivers seat and shall have readout accuracies within 1% of full scale for vehicle speed, engine RPM, torque and horsepower.

(d) *Vehicle restraining device.* A vehicle restraining device is necessary to hold the vehicle on the dynamometer rolls effectively for both front and rear-wheel driven vehicles.

(e) *Driver's aid.* A drivers aid device is not required but verification of vehicle speed by recording is necessary.

(f) *Cooling fan.* External cooling fans are not normally needed for the short tests, but some vehicles, when the ambient temperature exceeds 95°F, tend to overheat. In these cases it is permissible to use an engine cooling fan normally rated at 5300 CFM. The fan must have been certified for its capacity by the fan manufacturer and positioned as outlined in § 86.135–78(b).

(g) *RPM meter.* The engine rpm meter shall be AC powered and be provided with an induction type pickup so that no tools will be needed for attachment to the ignition system.

§ 85.2222 Exhaust gas sampling system.

(a) *General.* The existing sampling systems available for use in short tests are designed to sample the raw engine exhaust and determine the concentration of the pollutants by volume. The sample handling system is an integral part of the exhaust gas analyzer package and includes the pumps, valves, filters, moisture separator, lines, detectors, meters and sample probes.

(b) *Analyzer operation, maintenance, and durability.* The analyzer shall be simple to operate and maintain by garage personnel. The analyzer shall have sufficient durability and ruggedness for frequent use and continuous analysis at various vehicle exhaust flow rates for long periods in a garage environment.

(c) *Continuous measurement.* The instruments shall be capable of continuously measuring the concentration of carbon monoxide, hydrocarbons, and/or oxides of nitrogen in vehicle exhaust emissions during a succession of "Idle Mode", "Key Mode" and/or other short inspection tests.

(d) *Instrument readout.* A direct meter readout is required for each pollutant measured and an automatic or semi-automatic digital emission indication is desirable, with a voltage output capable of continuously interfacing with a digital indicator or computer for recording vehicle exhaust emissions.

(e) *Analyzer ranges.* The analyzers shall have either a multiple range or expanded scale presentation that provides the following approximate capabilities:

Maximum Ranges=0–10% CO, 0–2000 ppm HC, 0–2000 ppm NO. Minimum Graduations=0.05% CO, 5 ppm HC, 10 ppm NO.

(f) *Accuracy.* The accuracy of the analyzer shall be closer than ±3% of the full scale reading for all ranges.

(g) *Response time.* The response time for an exhaust gas sample introduced at

the probe shall be less than 10 seconds for 90% of the reading.

(h) *Calibration check.* The system shall contain a convenient calibration check for performance testing. The calibration method may be a gas standard or other mechanical or electrical method. Air may be used for zero checking.

(i) *Warm-up time.* Warm-up time shall be as short as possible, but not greater than 30 minutes from a cold start.

(j) *Electronic circuitry.* All electronics circuitry should be solid state.

(k) *Zero and span procedures.* Zeroing and spanning of the individual instruments of the system shall be performed before and after each emission test using the instrument manufacturers recommended methods, or other method if shown to be more satisfactory.

(l) *Sample line.* The sampling probe and sample line shall be long enough to cool the exhaust gas to a temperature sufficient to condense the water of combustion, so that there is no possibility of moisture condensing in the infrared cell or sampling handling system outside of the moisture separator and water drain, and that the specific humidity of the exhaust sample gas remain relatively constant so as not to cause undue interference. The moisture separator should be of such design that it does not require cooling water.

(m) *Sample probe.* The sample probe shall be of a replaceable type and shall be made from stainless steel tubing (or other inert metal) that is not less than ¼" inner diameter (I.D.) and not greater than ⅜" outer diameter (O.D.). The probe shall be of rugged construction, especially in the area where the probe is connected to the sample line, and be equipped with an insulated handle of proper length for easy use. The insertion end of the probe tubing shall be closed and the exhaust gas sample shall be drawn through four ⅛" holes regularly spaced away from the closed end.

(n) *Repeatability.* Repeatability of the system shall be ±1% of full scale during five successive samples of the same gas source over a one hour period of continuous operation. The zero and drift of a warm-up system shall be less than ±1% of full scale during an 8 hour period of continuous operation.

§ 85.2223 Calibration procedures—steady state modal tests.

(a) *Dynamometer calibration.* The dynamometer system described in § 85.2212(a) shall be calibrated in accordance with the manufacturer's basic instructions and then with the procedure specified in § 86.118–78 except that for use in these steady mode short tests, no inertia simulation is used (Item 3). The following conditions shall constitute an acceptable calibration of the system components:

(1) Four or more data points shall be measured that adequately span the horsepower range of the vehicles to be tested on the dynamometer.

(2) The minimum range covered by the data points shall be 20 horsepower.

(b) *Analyzer calibration.* Instruments shall be calibrated at least once during each testing day (usually just previous to the commencement of testing) in accordance with the manufacturer's instructions. Cross checks shall be made weekly using calibration gases of known accuracy that are related to N.B.S. standards. A desirable alternative method is to use a vehicle with repeatable emissions that has been equipped with analytical instruments and calibration gases, thereby reducing the unknowns.

(c) *Frequency of calibration.* The frequency of dynamometer calibration and the associated equipment used for testing shall, in general, be performed as often as required by the individual manufacturers of the equipment. In order to insure good standards of performance, however, both vehicle conformance checks and quality control calibrations should be performed as follows:

(1) Cross checks shall be made weekly on dynamometer systems using a vehicle with uniform or repeatable emissions to confirm the correlation between dynamometers and establish an acceptable degree of conformance. Of necessity this final emission test involves individual calibrations of the analytical instruments and gas correlation in addition to the chassis dynamometer calibration. A desirable alternative method is to use a vehicle with repeatable emissions that has been equipped with analytical instruments and calibration gases, thereby reducing the unknowns.

(2) The dynamometer system shall be calibrated at least monthly according to paragraph (a) of this section unless dynamometer maintenance has been performed which could alter the calibration. In that case, or if performance cross checks show deterioration, the calibration should be made as soon as possible.

§ 85.2224 [Reserved]

§ 85.2225 Idle test specifications.

(a) *General requirements.* Raw exhaust is collected via a sample probe(s) (as described in § 85.2222(m)) which is inserted into the vehicle tailpipe(s) while the vehicle idles in neutral at normal idle speed. The undiluted exhaust is analyzed continuously for the duration of the idle period, and the pollutant concentrations are read and recorded upon stabilization (or at the end of a 2 minute sample period). Emission concentrations are reported in ppm (by volume) for hydrocarbons and percent (by volume) for carbon monoxide.

(1) Vehicles shall be tested in the configuration in which they arrive at the test site, with no preconditioning or vehicle preparation. Vehicles shall be tested at the ambient temperatures encountered at the test sites. Vehicles shall be approximately level during the test sequence to prevent abnormal fuel distribution.

(2) Exhaust samples shall be taken from both tailpipes on vehicles which have more than one tailpipe exhaust outlet. The pollutant concentration levels shall be measured for exhaust samples from each tailpipe according to the procedures outlined in this subpart and then the average emission level of the two tailpipe exhaust samples shall be reported as the official test results.

(3) Under normal test condition, and normal vehicle operation, no cooling fan shall be used.

(4) If the engine stalls at any time during idle test, the engine shall be restarted and idled at 2500±200 rpm for 15–30 seconds and the test resumed.

(b) *Test sequence.* (1) Drive vehicle into test area.

(2) Attach engine speed pickup.

(3) Insert sample probe(s) into tailpipe(s).

(4) Calibrate analyzers according to § 85.2223(c) within 1 hour of the beginning of each test.

(5) Idle vehicle in neutral at 2500±200 rpm for 15 to 30 seconds within 1 minute of start at each test.

(6) Idle vehicle in neutral until emission levels stabilize or for a maximum of 2 minutes.

(7) Record concentrations of HC and CO upon stabilization or record the highest reading reached during the last 30 seconds of the 2 minute sampling period.

(8) Remove sample probe(s).

(9) Remove engine speed pickup.

(10) Drive vehicle out of test area.

(c) *Records required.* The following information shall be recorded with respect to each test:

(1) Test number.

(2) Date and time of day for each test.

(3) Instrument operator.

(4) Driver or operator.

(5) Vehicle: Make; model; vehicle identification number; model year; vehicle registration number and year; transmission type; odometer reading; engine displacement; idle rpm; fuel system (fuel injection, number of carburetors, number of carburetor barrels); inertia loading; vehicle registration weight; actual road load at 50 mph (80 km/h); drive wheel tire pressure, as applicable; emission control technology.

(6) All pertinent instrument information such as tuning; gain; serial number; detector number; range. As an alternative, a reference to a vehicle test lane number may be used, with the advance approval of EPA, provided test lane calibration records show the pertinent instrument information.

(7) Recorder charts: Identify zero, span, exhaust gas, and dilution air sample traces.

(8) Test cell barometric pressure, ambient temperature and humidity.

NOTE.—A central laboratory barometer may be used: *Provided*, That individual test lane barometric pressures are shown to be within ±0.1 percent of the barometric pressure at the central barometer location.

(d) *Test report.* A test report shall be completed in triplicate on a form ap-

proved by EPA and shall contain the following information. One copy shall be given to the vehicle owner or his agent.

(1) Test type and driving schedule.
(2) VIN/License No.
(3) Owners name and address.
(4) Car make, model, MY, engine size.
(5) Date of test.
(6) Odometer reading.
(7) Date of previous test on vehicle, if retest.
(8) Inertia and road load if applicable.
(9) Test site location, lane identification.
(10) Test results (including emission measurement values).
(11) Certification by instrument operation and driver that test was correctly performed.

§ 85.2226 Equipment specifications—idle test.

The equipment described in §§ 85.2227 and 85.2228 shall be used in idle mode tests.

§ 85.2227 Dynamometer system.

None required.

§ 85.2228 Exhaust gas sampling system.

(a) *General.* The existing sampling systems available for use in short tests are designed to sample the raw engine exhaust and determine the concentration of the pollutants by volume. The sample handling system is an integral part of the exhaust gas analyzer package and includes the pumps, valves, filters, moisture separator, lines, detectors, meters, and sample probes.

(b) *Analyzer operation, maintenance, and durability.* The analyzer shall be simple to operate and maintain by garage personnel. The analyzer shall have sufficient durability and ruggedness for frequent use and continuous analysis at various vehicle exhaust flow rates for long periods in a garage environment.

(c) *Continuous measurement.* The instruments shall be capable of continuously measuring the concentration of carbon monoxide and hydrocarbons in vehicle exhaust emissions during an "Idle Mode".

(d) *Instrument readout.* A direct meter readout is required for each pollutant measured and an automatic or semi-automatic digital emission indication is desirable, with a voltage output capable of continuously interfacing with a digital indicator or computer for recording vehicle exhaust emissions.

(e) *Analyzer ranges.* The analyzers shall have either a multiple range or expanded scale presentation that provides the following approximate capabilities:

Maximum ranges—0—10 percent CO, 0–2000 ppm HS.
Minimum graduations—0.05 percent CO, 10 ppm HC.

(f) *Accuracy.* The accuracy of the analyzer shall be closer than ±3 percent of the full scale reading for all ranges.

(g) *Response time.* The response time for an exhaust gas sample introduced at the probe shall be less than 10 seconds for 90 percent of the reading.

(h) *Calibration check.* The system shall contain a convenient calibration check for performance testing. The calibration method may be a gas standard or other mechanical or electrical method. Air may be used for zero checking.

(i) *Warm-up time.* Warm-up time shall be short as possible, but not greater than 30 minutes from a cold start.

(j) *Electronic circuitry.* All electronics circuitry should be solid state.

(k) *Zero and span procedures.* Zeroing and spanning of the individual instruments of the system shall be performed before and after each emission test using the instrument manufacturers' recommended methods, or other method if shown to be more satisfactory.

(l) *Sample line.* The sampling probe and sample line shall be long enough to cool the exhaust gas to a temperature sufficient to condense the water of combustion. This is to assure that no moisture condenses in the infrared cell or sample handling system outside of the moisture separator and water drain, and to assure that the specific humidity of the exhaust sample gas remains relatively constant so as not to cause undue interference. The moisture separator should be of such design that it does not require cooling water.

(m) *Sample probe.* The sample probe shall be of a replaceable type and it shall be made from stainless steel tubing (or other inert metal) that is not less than ¼" I.D. and not greater than ⅜" O.D. The probe shall be of rugged construction, especially in the area where the probe is connected to the sample line, and be equipped with an insulated handle of proper length for easy use. The insertion end of the probe tubing shall be closed and the exhaust gas sample shall be drawn through four ⅛" holes regularly spaced away from the closed end.

(n) *Repeatability.* Repeatability of the system shall be ±1 percent of full scale during five successive samples of the same gas source over a one hour period of continuous operation. The zero and drift of a warmed-up system shall be less than ±1 percent of full scale during an 8-hour period of continuous operation.

§ 85.2229 Calibration procedures—idle test.

(a) Instruments shall be calibrated in accordance with the manufacturers' instructions. Cross checks shall be made weekly using calibration gases of known accuracy that are related to N.B.S. standards. A desirable alternative method is to use a vehicle with repeatable emissions that has been equipped with analytical instruments and calibration gases, thereby reducing the unknowns.

Subpart X—Section 207(b) Short Test Cutpoint Methodology

§ 85.2301 General applicability.

The provisions of this subpart are applicable to 1979 and later model year light-duty vehicles and 1979 and later model year light-duty trucks.

§ 85.2302 Definitions.

The following definitions apply to this subpart beginning with the 1979 model year. Section 86.078–2 remains effective excepting those definitions which are hereby superseded and/or added.

"Car line" means a name denoting a class of vehicles within a make or car division which has a degree of commonality in construction (e.g., body, chassis). Car line does not consider any level of decor or opulence and is not generally distinguished by such characteristics as roof line, number of doors, seats or windows except for station wagons. Station wagons are considered to be different car lines than passenger cars.

"Contingency table analysis" is based upon the assumption that cutpoints can be found for one or more independent variables which will discriminate on the groups of the dependent variable. The selection of the cutpoints results in the a contingency table analysis it is sufficient to identify the number of important ent to identify the number of important groups into which the dependent variable needs to be classified. For the purposes of 207(b) implementation, there are only two such groups: vehicles which pass the FTP and vehicles which fail the FTP. Thus, Figure 1 shows the 207(b) application of a contingency table.

Predicted variable

	(FTP) of—	
	Pass	Fail
Predictor variable (ST):		
Pass	Correctly passed vehicles. *PP*	Error of omission vehicles. E_o
Fail	Error of Commission vehicles. E_c	Correctly failed vehicles. *FF*

FIGURE 1

"E_c"=cars which are incorrectly failed by the ST (commission errors).
"E_o"=cars which are incorrectly passed by the ST (omission errors).
"*FF*"=cars which are correctly failed by the ST.
"*PP*"=cars which are correctly passed by the ST.

"Distribution Characteristics" means the curve which best fits the emissions data when plotted as emission levels vs the fraction of vehicles which exhibit each emission level. The curve fit is accomplished using standard statistical distributions such as the normal, log-normal, Weibull, etc.

"Engine size" means the displacement of the engine and is not dependent upon the "engine family" definition used in the vehicle certification process.

"Group" means a classification of vehicles into classes having the same manufacturer, engine displacement, cylinder block configuration (e.g. V–8, I–6, etc.), number of cylinders, fuel injection or carburetion (number of carburetors and number of carburetor venturies), emis-

sion control systems, inertia weight, and car line.

"Light-Duty Truck" means any motor vehicle, rated at 8,500 pounds GVW or less which has a vehicle curb weight of 6,000 pounds or under and which has a basic vehicle frontal area of 46 square feet or less, which is: (1) Designed primarily for purposes of transportation of property or is a derivation of such a vehicle or (2) designed primarily for transportation of persons and having a capacity for more than 12 persons, or (3) available with special features enabling off-street or off-highway operation and use.

"Light-Duty Vehicle" means a passenger car or passenger car derivative capable of seating 12 passengers or less.

"Make" means the division or similar name within a manufacturing corporation which appears on the vehicle, e.g., Chevrolet, Mercury, Dodge etc.

"Manufacturer" means the major financial entity whose diyisions market vehicles, e.g. General Motors, Ford Motor Company etc.

"Short Test Rejection Ratio" means the ratio of vehicles failing the short test to vehicles failing the FTP. Expressed as an equation: $STRR=(E_c+FF)/(E_c+FF)$.

"Short test variability" means the ratio of the standard deviation to the mean of the short test levels within a narrow range of FTP levels.

"Technology" is used to differentiate between diverse concepts used in meeting the emission standards, e.g. catalyst, "lean burn", thermal reactor, etc.

"Vehicle size and/or weight" uses the manufacturing corporation body coding to identify vehicles in a group, as this body coding is generally understood to differentiate between full size, intermediate size, compact, etc. vehicles.

§ 85.2303 Overview.

Short test cutpoints will be established on a yearly basis by the United States Environmental Protection Agency for the most recent model year light duty vehicles and light duty trucks for each of the approved short tests. These short test cutpoints will remain in effect for the useful life of each vehicle as defined in § 86.077–2.

§ 85.2304 Vehicle grouping.

(a) For the purposes of establishing short test cutpoints, vehicles will be grouped by make, engine size, vehicle size and/or weight, and the technology used to meet the emissions standards. Vehicles so classified will be defined as a "group."

(b) In order to reduce the number of groups, when two vehicles are the same except for make they will be classified into a single group. For example, Ford Granada and Mercury Monarch will be classified into the same group because they are built from the same manufacturer's body. However, more than one group will exist for this example of consolidation by body code because of the different engine options which are offered in this basic body.

(c) In order to facilitate the process of consolidation, manufacturers will be required to provide the Agency with the marketing model identifications which are derived from the same basic body type, the commonality of engines which are used across manufacturer brands, and the differences in technology that can exist within otherwise identical vehicles and can result in the establishment of a new group. This information is to be supplied to the Administrator by September 30 of the calendar year in which the new model year vehicles are introduced.

§ 85.2305 Data collection.

(a) Data which will be used in the establishment of the short test cutpoints will be collected from one or both of the following sources:

(1) Through the testing of consumer-owned production vehicles. The testing will be performed by the EPA or its contractors. Testing will occur at different locations throughout the country so that the data may be collected in a timely fashion. Additionally, the collection of data in several localities will account for the variations in weather which occur throughout the Nation, as these variations may impact the short test/FTP relationship.

(2) Through the extrapolation of assembly line test data acquired during production of representative samples of each vehicle group.

(b) Testing of these vehicles will consist of the FTP and each approved short test. The FTP will be performed as specified in the FEDERAL REGISTER for that model year vehicle, exclusive of evaporative emissions. The short test will be performed as specified under conditions which reflect real world vehicle inspection station conditions (i.e., ambient conditions, fuel used, etc).

(c) Approximately fifty vehicles will be tested in each group. This sample size is selected because it is the smallest size which is judged to be capable of producing statistically viable results on the effects of production variables as these variables impact on the short test and FTP results.

(d) If the Administrator determines that sufficient evidence of commonality exists, groups of vehicles may be combined in order to minimize the amount of testing required and the number of different cutpoints which must be established. Manufacturers of vehicle groups which have been combined may submit test data to the Administrator to support claims that particular groups of vehicles should not (or should no longer) be included in combined groups. Based upon available data the Administrator may combine or separate vehicles groups at any time subsequent to the establishment of the initial cutpoints.

§ 85.2306 Short test cutpoint selection.

(a) Short test cutpoints will be selected for each vehicle group based upon the analytical technique described in § 85.2307 and the cutpoint selection methodologies described in § 85.2308.

(b) Manufacturers will be given two weeks to review the selected cutpoints before they are promulgated. Unless the manufacturers can submit data indicating why the selected cutpoints are not appropriate for one or more of their car groups, the cutpoints will become effective.

(c) Cutpoint information will be on file at the U.S. Environmental Protection Agency, Public Information Reference Unit, Rm. 2922, 401 M Street, SW., Washington, D.C. 20460.

(d) Should the Administrator determine, through testing by EPA or by review of manufacturer submitted data, that the cutpoints for a given group need to be changed, such a change will become effective immediately.

(e) Should a manufacturer request a vehicle running change under § 86.077–33, Part 86, of this Title 40, CFR, which requires him to run further certification tests, the manufacturer will be required to submit to the Administrator, data which would indicate any changes in the short tests (as specified in Subpart W) to FTP relationships which occur because of the running change.

§ 85.2307 Analytical technique.

(a) The cutpoints for each pollutant for each short test will be established by the use of the contingency table analytical technique.

(b) The data used to establish each group's cutpoints will be generated from the sample of test data as follows:

(1) Establish the FTP and short test distribution characteristics per pollutant for each group and for each short test from the test data.

(2) Using these data, a distribution will be developed for a very large (e.g., 50,000 vehicle) fleet of vehicles in the group. This step smooths the data and prevents the distortion of the selected cutpoints by gaps which may exist in the test data.

(3) Using the prescribed methodology for short test cutpoint selection, an iterative procedure will be followed to select the short test cutpoints which meet the criteria for each pollutant, for each short test and for each group.

§ 85.2308 Cutpoint selection methodologies.

(a) Any of the following techniques can be used by the EPA to select cutpoints.

(1) *A fixed error of commission rate* for each pollutant for each group. The short test cutpoints are determined on the basis of the distribution characteristics of the vehicles tested in each group so that the error of commission rate meets a set value.

(2) A fixed *Short Test Rejection Ratio* for each pollutant for each group. The short test cutpoints are determined on the basis of the distribution characteristics of the vehicles' emissions as determined in each group so as to meet the prescribed short test rejection ratio value.

(3) A fixed level for $E_c/(E_c+FF)$; which expresses the percentage of improperly failed vehicles as a function of all vehicles failing the short test in a par-

ticular group. The short test cutpoints are determined from the test data as described above but to meet the prescribed value of $E_c/(E_c+FF)$.

(4) Set the short test cutpoints so that equivalent FTP pass/fail levels are enacted for each vehicle group. This option would work in conjunction with a fixed acceptable commission error rate. For all groups of vehicles with acceptable test variability, the fixed error of commission cutpoint would be computed using the contingency table technique. Then, the FTP levels equivalent to the short test cutpoints for each group would be computed using linear regression estimates with the FTP as the independent variable and the short test as the dependent variable. In order to treat each group of vehicles equally from an air quality standpoint, the highest computed FTP levels for each pollutant would be selected as the equivalent FTP levels for the short test cutpoints. Using regression techniques, the short test cutpoints equivalent to these FTP levels would be determined for each vehicle group and would become the 207(b) short test cutpoints.

(5) Set the error of commission rate or $E_c/(E_c+FF)$ rate as a function of short test variability. Allow a five percent error of commission rate when test variability is at the maximum acceptable level.

A functional relationship between errors of commission or $E_c/(E_c+FF)$ and variability will be developed using mathematical simulation techniques. This will be accomplished by taking a set of data and using probability distribution theory and introducing random numbers variability into the data base at different levels. Then, using fixed short test cutpoints, commission errors can be computed and plotted against variability.

(b) The above procedures of setting short test cutpoints are applicable where the vehicles in each group are divided between FTP passing and FTP failing characteristics. Cases can arise, however, when the vehicles in a group either all pass or all fail the FTP. Under these conditions, none of the above options are viable as means of setting the short test cutpoints. There are six options possible for handling this problem. Two are by mathematical means, two require additional testing and two rely on engineering judgment. Any of the following methods can be used to select short test cutpoints.

(1) This option would fit a linear regression equation to the available data and use it to project the short test/FTP relationship beyond the region of available data. The short test cutpoint would be selected to correspond with the FTP standard, allowing a margin of safety to account for correlation. Expressed in equation form, this approach says:

$$ST_{cutpoint} = ST_{value\ at\ regression\ line\ intercept\ with\ FTP} \times (f)\ \frac{1}{\text{correlation coefficient}}$$

where f is determined from analysis of data from groups including passing and failing vehicles.

(2) Option 2 would fit a statistical probability distribution to the available data. Then, data would be mathematically generated in the region where they do not exist. The chosen method of selecting the cutpoints would then be applied.

(3) A defect test program would be initiated to obtain data in the region where the population of vehicles is scarce. In cases where there is no data on FTP passing cars, the program would consist of tune-ups rather than incorporation of defects. Such a program would require a knowledge of what defects to introduce as well as a large number of vehicles and tests, so as to include vehicle to vehicle variability.

(4) An additional group of vehicles would be tested. If this second group of vehicles included vehicles dissimilar to those originally tested (i.e., not all either FTP passing or failing vehicles), the ST cutpoint would be set from the second group of vehicles. This option possesses the weakness that the second group could behave the same as the first group and nothing would have been accomplished.

(5) Standards from a similar group would be transferred. This option would apply within groups of vehicles produced by the same manufacturer. Provided the same vehicle size/engine size/technology is utilized in meeting emissions standards, it can be argued that the products manufactured by Division A of a corporation are sufficiently similar to the products from Division B for the ST cutpoints to be transferable in this eventuality. An example of this approach is the use of Chevrolet Division intermediate size vehicle short test cutpoints for Pontiac Division intermediate size vehicles: *Provided*, The same displacement engine (but not necessarily the same engine family) and emissions control technology (e.g., catalyst) were used in both groups.

(6) Use the manufacturers' HC and CO idle specifications for the idle test cutpoint. This option only applies to inspection programs where the idle test is utilized.

[FR Doc.77-14620 Filed 5-24-77;8:45 am]

[40 CFR Part 85]

[FRL-691-4]

EMISSION CONTROL SYSTEM PERFORMANCE

Warranty Regulations

AGENCY: Environmental Protection Agency.

ACTION: Notice of proposed rulemaking.

SUMMARY: This notice proposes regulations to implement section 207(b)(2) of the Clean Air Act—the emissions performance warranty. The warranty would require that a properly maintained and operated vehicle which fails an EPA-approved emissions short test during its useful life (5 years or 50,000 miles, whichever first occurs) will be remedied by the manufacturer should the owner face a penalty or sanction because of that failure. Emissions short tests are being proposed in a separate notice in today's FEDERAL REGISTER.

DATE: Deadline for submission of written comments: August 23, 1977.

FOR FURTHER INFORMATION CONTACT:

Mr. Michael Scibinico, Environmental Protection Agency, Mobile Source Enforcement Division (EN-340), 401 M Street, SW., Washington, D.C. 20460. 202-755-0298.

SUPPLEMENTARY INFORMATION:

I. EXPLANATORY STATEMENT

Section 207(b) of the Clean Air Act provides, in total:

> If the Administrator determines that (i) there are available testing methods and procedures to ascertain whether, when in actual use throughout its useful life (as determined under section 202(d)), each vehicle and engine to which regulations under section 202 apply complies with the emission standards of such regulations, (ii) such methods and procedures are in accordance with good engineering practices and (iii) such methods and proceedures are reasonably capable of being correlated with tests conducted under section 206(a)(1), then—
>
> [(b)(1)]
>
> (1) he shall establish such methods and procedures by regulation, and
>
> [(b)(2)]
>
> (2) at such time as he determines that inspection facilities or equipment are available for purposes of carrying out testing methods and procedures established under paragraph (1), *he shall prescribe regulations which shall require manufacturers to warrant* the emission control device or system of each new motor vehicle or new motor vehicle engine to which a regulation under section 202 applies and which is manufactured in a model year beginning after the Administrator first prescribes warranty regulations under this paragraph (2). The warranty under such regulations shall run to the ultimate purchaser and each subsequent purchaser and shall provide that if—
>
> (A) the vehicle or engine is maintained and operated in accordance with instructions under subsection (c)(3),
>
> (B) it fails to conform at any time during its useful life (as determined under section 202(d)) to the regulations prescribed under section 202, and
>
> (C) such nonconformity results in the ultimate purchaser (or any subsequent purchaser) of such vehicle or engine having to bear any penalty or other sanction (including the denial of the right to use such vehicle or engine) under State or Federal law,
>
> then such manufacturer shall remedy such nonconformity under such warranty with the cost thereof to be borne by the manufacturer." (Emphasis added.)

Thus, full implementation of this section requires a number of findings by the Administrator leading to regulations under subsection (b)(1), and then a separate

finding leading to regulations under subsection (b)(2). The Agency is today proposing both sets of regulations under separate headings. This notice relates exclusively to subsection (b)(2), although some general background information is given below for the reader's convenience. The subsection (b)(1) proposal is entitled "Emission Control Performance Warranty Regulations—Short Test Establishment" and can be found in this volume of the FEDERAL REGISTER.

Section 207(b) requires a vehicle manufacturer, following implementation of subsection (b)(2), to warrant that a properly maintained and operated vehicle which fails a subsection (b)(1) test (hereinafter called a short test) during its useful life (5 years or 50,000 miles, whichever comes first, for all vehicles covered by this proposal) will be remedied by the manufacturer should the owner face a penalty or sanction because of that failure. This warranty (hereinafter called the Emissions Performance Warranty) is expected to become an important element in state and local emissions inspection programs, and an inducement towards improved maintenance on vehicles. These factors (often considered together as "Inspection/Maintenance" or "I/M") represent the Clean Air Act strategy which ultimately has the greatest potential for ensuring that in-use vehicles perform within emission standards.

The major obstacle which has delayed implementation to date of the Emissions Performance Warranty has been the technical difficulty in identifying short tests which "are reasonably capable of being correlated" (as the Act requires) with the sophisticated test used to define the Federal emission standards. That test, set out at 40 CFR Part 86, Subpart B, for 1977 and later model year light duty vehicles and light duty trucks, is too complex to be of use in a State or local inspection program.

The Agency believes that such short tests are now identifiable, and that the remaining criteria for publication of regulations under subsection (b)(1) are also satisfied. Consequently, those regulations are being proposed today, and form the basis for the proposal set out herein.

Under subsection (b)(2), the Administrator must "determine that inspection facilities or equipment are available for purposes of carrying out (the identified short tests)". This is interpreted to require a finding either that facilities exist which could be use to carry out the short tests, or that equipment needed to establish testing capability is available at a reasonable cost. The Administrator hereby finds that both of these circumstances presently exist. A number of emissions inspection facilities are already in operation in different States across the country. New Jersey has had a statewide program in operation for over four years. Active testing is ongoing in Portland, Oregon; Phoenix, and Tucson, Arizona; Riverside, California; Las Vegas, Nevada; Chicago, Illinois; and Cincinnati, Ohio. In all, millions of vehicles have been inspected to date using tests basically identical to those proposed today under subsection (b)(1), including both "idle" and "key mode" tests. It should be noted that the idle test may be performed without special facilities, and that the analyzers required for it are readily available and presently being sold to many service facilities for use as maintenance equipment. In sum, a State or local government which desires to engage in short test inspections is presently able to establish and equip a site capable of this type of testing.

II. GENERAL DESCRIPTION OF REGULATIONS.

The provisions of this notice cover all aspects of the Emissions Performance Warranty. They apply to light duty vehicles and light duty trucks; those being the categories covered by today's short test proposal. Further, as specifically required by the Act, the warranty will be applicable only to those vehicles manufactured in a model year beginning after the regulations are promulgated. (It is anticipated that 1979 and later model year vehicles will be covered.) The required warranty itself is taken directly from subsection 207(b)(2) of the Act. Under the proposal, it would have to be printed in the owner's manual for each vehicle.

Much of the proposal is devoted to the proper maintenance and operation condition of subsection 207(b)(2)(A) of the Act. Provisions cover the permissible content of maintenance and operation instructions, limits on brand name specifications, the types of evidence which will establish compliance with such instructions, Agency review and disapproval of them, and communication of these requirements to vehicle owners. Each is disscussed in detail below. The maintenance condition represents the most critical aspect of the Emission Performance Warranty. Given the fact that most vehicles do require periodic service in order to perform within emission standards for 5 years/50,000 miles, and that the owner is responsible for such work, the question becomes how this duty is to be fairly administered.

From the standpoint of the vehicle manufacturers, a simple solution might be to require that all maintenance be performed at dealer service centers or other authorized facilities. This would give the manufacturer control over the product which he must warrant. However, such an approach is unacceptable for a number of reasons. First, it is unlikely that there are enough authorized facilities in existence to handle the workload that could result. Second, this requirement would have a tremendous anticompetitive impact on the vast independent automotive service and parts industry presently in existence, in contradiction to the Agency's general policy to minimize any such impact from its regulations. Third, the right of an owner to personally maintain his own vehicle would be hindered. Lastly, there is no indication that this course of action would, in fact, ensure that vehicles would be significantly better maintained than they are today.

The Agency believes that the Emissions Performance Warranty may be implemented within the context of the traditional relationships among the affected parties, and that this should be a primary goal of the regulations. Consequently, the maintenance provisions are aimed at ensuring owners may continue to care for their vehicles as they presently do, without jeopardizing protection under the warranty.

The remainder of the proposal speaks of the remedy required by a manufacturer under the Emissions Performance Warranty, and the procedure by which a claim may be brought. Since communication to the warranty is crucial to the effectiveness of this or any other warranty, detailed requirements are set out for the inclusion of all provisions in vehicle owner's manuals.

III. BENEFITS OF THE EMISSIONS PERFORMANCE WARRANTY

By its nature, the Emissions Performance Warranty does not contain a direct, quantifiable air quality benefit. All warranties are in theory only cost-shifting mechanisms. That is, they determine who will pay to correct a problem; they do not attack the probem itself. In this case, the problem is poor emissions performance of in-use vehicles. The key to reducing it lies in State and local "Inspection/Maintenance" programs, as previously mentioned. Since, a local jurisdiction could enforce emissions standards by requiring the owner to bear any repair expense, and thus obtain emissions reductions without warranty coverage, the warranty may not be fairly credited with the major reduction expected from enforcement of "I/M" programs. However, some indirect air quality benefits may arise from the Warranty to the extent that it provides an incentive to establishment of "I/M" programs in areas which would otherwise not have them, causes programs to enforce stricter standards, encourages owners to better maintain their cars, and influences manufacturers to build more durable emissions control systems. The magnitude of these benefits is not quantifiable, and only experience will demonstrate the extent to which they will contribute to the overall benefits expected from "Inspection/Maintenance."

The Agency considers the Emissions Performance Warranty, coupled with the establishment of "I/M" programs, to be a major step in the Clean Air Act approch to reduction of vehicle emissions. Present Agency efforts include certification of vehicles and recall of classes which perform poorly in-use. Regulations for assembly line testing of vehicles (Selective Enforcement Auditing or SEA) where recently promulgated, and testing under them has begun. The establishment of a warranty to all individual owners that their vehicles will, if properly maintained and operated, continue to meet emissions standards is another substantial inducement to manufacturers to produce vehicles capable of meeting standards for their useful life.

IV. Specific Provisions

The major sections of the proposed regulations are discussed below.

A. Section 85.2103 Warranty

The proposed basic statement of the warranty is fashioned directly from section 207(b)(2) of the Clean Air Act. Some changes have been made as follows in an effort to make the provisions more easily understandable to vehicle owners.

First, in subsection (a)(1), the maintenance and operation requirement of section 207(b)(2)(A) of the Act is spelled out rather than referencing section 207(c)(3) as is done in the Act. Since the proposal requires the manufacturer to list all such instructions applicable to the Emissions Performance Warranty in the owner's manual, it is believed that the least confusing approach to informing the owner of his duty in this regard is simply to identify the requirement as consisting of those listed instructions.

Second, the words "applicable emissions standards of the U.S. Environmental Protection Agency" are substituted for the reference in section 207(b)(2)(B) to section 202 of the Act.

Third, the term "EPA-approved emission test" is used to signify a "correlateable short test" as required by section 207(b) for implementation of the Emissions Performance Warranty. This is intended to provide a non-technical label by which those tests which qualify for section 207(b) warranty purposes may be identified. Further, § 85.2103(a)(2) makes clear the fact that it is failure of such a test that initially triggers the possibility of manufacturer liability under the Emissions Performance Warranty.

No substantive effects are intended by any of the above modifications; any comments that such may occur are specifically requested.

An important issue under the Emissions Performance Warranty is the required scope of coverage. Section 207(b) of the Act states that manufacturers shall warrant "the emission control device or system of each new motor vehicle * * * manufactured in a model year beginning after (regulations are promulgated)." The phrase "emission control device or system" raises the question as to exactly what parts or systems of a vehicle are to be covered by the warranty. The proposal takes a broad interpretation here by defining coverage to include "any system, assembly, device, or component thereof which can affect emissions." An alternative approach would be to limit coverage to a specific list of those items constituting the emission control system, perhaps limited only to those components added solely for the purpose of controlling emissions. However, measures adopted for controlling emissions include important alterations to components and operating parameters of engines which are also vital to the non-emissions performance of those engines. To ignore such items would both excuse the manufacturer from responsibility for a substantial number of potential causes of emissions nonconformities within his ability to affect, and would leave the owner unprotected to the same extent. Hence, the Agency believes that the proposed option is most in keeping with the intent behind the Emissions Performance Warranty.

It has been postulated that the "list approach" would have the advantage of reducing the potential anticompetitive effect of the warranty simply because fewer components would be covered. However, given the possibility of warranty protection, it is presumed that any properly maintained and operated vehicle which fails an Agency-approved short-test will initially be taken to a dealer for repairs. Should the cause of the failure be investigated and found to be a part not on a given list, then the manufacturer would escape liability, but, the dealer would most likely still make the repair. Thus, little if any significant reduction in anticompetitive effect could be expected. In any case, a much larger potential for anticompetitive effect lies in the possible tying of preventative maintenance to the warranty, as opposed to actual repair of failed vehicles. This area, discussed in detail below, would not be affected by a restrictive definition of the scope of coverage of the warranty.

Comments on this aspect of the proposal are particularly requested. Those favoring a list approach are asked to give a sample list, if possible, of those parts which they believe should be included, or in the alternative, a list of those parts which are felt to be incorrectly encompassed by the proposal.

Subsection (b) specifies the time from which the 5 year protection of the Emissions Performance Warranty is to begin. In the vast majority of cases, this will coincide with delivery of the vehicle to its ultimate purchaser. However, for those vehicles used as "demonstrators" or "company cars" by a manufacturer or dealer, the period is begun at the point they are placed in this service. Although such a vehicle is not then in the hands of an ultimate purchaser, the Agency believes that it is reasonable to view it as having begun its useful life. There is little chance of consumer deception here since these cars are not sold as new, and thus purchasers generally realize that they have been used and that, consequently, their warranty protection may be less.

With regard to mileage, the warranty period is to be judged simply by a vehicle's odometer reading. That reading is protected today by numerous Federal and State consumer laws, and need not be further considered here. Any odometer which is adjusted in violation of applicable law will no longer be controlling as to the Emissions Performance Warranty.

Manufacturers should bear in mind that section 203(a)(4)(A) of the Act makes it a prohibited act to sell or lease a vehicle without warranting the emission control device or system pursuant to section 207(b). EPA will investigate any pattern of activity of a manufacturer which suggests that such warranty was not made in good faith.

B. Section 85.2104 Instructions for Maintenance and Proper Operation

This section sets out basic criteria for inclusion of instructions under the maintenance and operation condition of § 85.2103(a)(1), section 207(b)(A) of the Clean Air Act. Subsection (a) reiterates the language of section 207(c)(3) of the Act for maintenance instructions, with the clarifying provision that such instructions be likely to be performed on in-use vehicles. The additional language is included to set out what the Agency considers to be a basic element of the Act's requirement that such instructions be "reasonable."

Subsection (b) requires all maintenance instructions to be set out such that a person who regularly engages in the business of servicing automobiles will be able to satisfactorily comply with them. This is a further elaboration of the "reasonable" requirement of section 207(c)(3) of the Act. Recognizing the fact that many vehicles will be serviced at independent, non-dealer facilities, this provision can be viewed as simply part of the standard of "likely to be performed in-use." Further, it supports the prohibition of § 85.2105 against the tying of warranty coverage to dealer service.

Subsection (c) proposes a partial solution to the problem of owner maintenance. Given that many owners maintain their own vehicles, the question becomes how such individuals will be able to prove that the required instructions have been carried out. The proposed § 85.2107, which deals specifically with the issue of proof, expressly reserves the acknowledged right of an owner to perform all of the required maintenance. However, the standard of proof under such circumstances necessarily places a higher burden on the owner than he would have if he had taken his vehicle to a dealer or an independent service facility. This is due to the fact that not all owners will have the instruments and skills necessary to adequately maintain the emission control systems and devices in use today. Thus, an owner who claims the ability to totally maintain his vehicle needs to establish, essentially, that he is capable of doing so.

However, there are a substantial number of maintenance instructions which are capable of being performed by most owners (e.g., oil and filter changes, spark plug replacements, etc.). The Agency believes that these maintenance items should not be removed from the purview of owners out of their concern that they will risk loss of warranty protection by performing the instruction. One way to approach this problem would be for the Agency to define those instructions capable of owner completion, and to specify minimum requirements for proof of such. The different technologies among vehicle manufacturers would greatly complicate the effort, but the sustaining of owner's rights in this area is considered to be a necessary aspect of the regulations.

Subsection (c) proposes an alternative approach. Since a vehicle manufacturer

is in the best position to determine which maintenance instructions for his product are capable of being performed by an owner, the manufacturer is encouraged to specify such items, along with whatever evidence he would be willing to accept as proof of compliance. It is expected that manufacturers who do this will be able to gain from advertising that their vehicles are "owner serviceable", while at the same time reducing the potential for future disagreements with owners regarding proper maintenance. The approach also puts control of the question of proof in the hands of the manufacturer while protecting owners since, once specified, the manufacturer will be bound to accept the evidence called for. The Agency hopes that the owner's burden will be set at a minimal level such as, for example, retention of receipts or old parts. But, the most important factor is that advance notice will be given as to the required evidence, whatever it may be.

The Agency particularly requests comments on this proposed approach to the problem under the Emissions Performance Warranty of maintenance performed by owners. Manufacturers are encouraged to provide examples of what maintenance they would consider designating as "owner maintenance", and the evidence which would be accepted as proof of compliance.

Subsection (d) reiterates the criteria of section 207(c)(3) of the Clean Air Act for inclusion of operation instructions under § 85.2103(a)(1) of the proposal. Additional language is added to provide that all such instructions "be consistent with the normal use for which the vehicle is sold." As discussed above for subsection (a), this is again intended to elaborate on the Agency's view of how the term "reasonable" is to be interpreted in this specific context so as to give adequate notice to manufacturers regarding the standard for operation instructions required under the Emissions Performance Warranty.

C. SECTION 85.2105 PROHIBITION AGAINST BRAND NAME REQUIREMENTS

This section contains the proposal's basic prohibition against tying of the maintenance and operation condition of § 85.2103(a)(1) to the use of only parts and service provided by the vehicle manufacturer. It contains essentially the same restriction as that of section 102(c) of the Magnuson-Moss Warranty Act, 15 U.S.C. 2302(c) (1975).

Section 207(b)(2)(A) of the Clean Air Act explicitly conditions manufacturer liability under the Performance Warranty on a vehicle being "maintained and operated in accordance with instructions issued under (207)(c)(3)." Since the passage of the Clean Air Act Amendments of 1970, this condition has been the focus of much attention from EPA and from Congress itself. No one disputes the basic concept involved; that is, that a car owner is responsible for reasonable and necessary periodic maintenance of his vehicle. However, some segments of the automotive industry have expressed concern that the provision is potentially anticompetitive in that it may shift maintenance work away from independent facilities and towards manufacturer authorized dealerships.

The actual danger of such a shift is difficult to evaluate given the present lack of experience with any similar type warranty. On December 16, 1974, the Subcommittee on Environmental Problems Affecting Small Business of the Permanent Select Committee on Small Business of the House of Representatives filed a report entitled "Monopolistic Tendencies of Auto Emission Warranty Provisions" (House Report No. 93-1628, 93d Congress, 2d Session). That report concluded that the Emissions Performance Warranty could prove to be anticompetitive in that car owners might feel compelled to use only dealer service and original equipment parts in order to ensure continued protection for the full 5 years/50,000 mile period. Accordingly, the Committee recommended, among other things, that EPA pursue all administrative remedies to minimize such an effect.

The proposal contains three sections aimed directly at this potential problem. Section 85.2105, as stated, represents the basic restriction. Sections 85.2106 and 85.2107 deal respectively with the issue as related to parts and service under the Emissions Performance Warranty, and are discussed in detail below.

D. SECTION 85.2106 REPLACEMENT PARTS

With regard to the replacement parts industry, the potential for anticompetitive effects from the Emissions Performance Warranty rests in the concern that owners will use only original equipment parts so as to ensure continued protection for the full 5 year/50,000 mile period, and that service facilities will also react in the same manner. Thus, the provisions of the proposal which address the issue of performance of maintenance at independent facilities do not encompass the parts issue. Section 85.2106 is intended to fill this gap.

The basic position of § 85.2106 is twofold. First, subsection (a) provides that unless a vehicle manufacturer affirmatively indicates otherwise, he must allow use of any part identified by its manufacturer as a replacement part for a specific vehicle in question. Second, subsection (b) provides that a manufacturer who desires to avoid subsection (a) may do so by providing information sufficient to determine whether a given part meets the standards which are required. In essence, a manufacturer may set up any standard of acceptability, consistent with section 85.2105, related to the emissions performance of parts required to be replaced under the warranty. For example, he may require that all replacements be "equivalent" to the original part, as most do under general warranties today. However, if this approach is taken, then the owner's manual must set out whatever specifications are needed to judge that equivalency. In other words, the owner must be provided with the information necessary to be able to distinguish between those parts which are, and those which are not equivalent. Without this information, an "equivalency" requirement becomes virtually identical to a specification of use of only original equipment parts.

In short, the proposal allows inclusion of a "standard" for acceptability of replacement parts only if that standard may actually be applied in practice against the numerous available aftermarket parts. Otherwise, use of any part sold as a replacement will be acceptable. This is not to say that the vehicle manufacturer will be held liable for the failure of a non original equipment part. Subsection (d) specifically reserves the ability of a manufacturer to deny a warranty claim if he can show that the vehicle's failure of a short test was due to such a part.

Subsection (c) is included in anticipation of the possibility of a future EPA program for certification of aftermarket automotive parts. No such program is presently in operation, although the Agency has published an advance notice of a voluntary program (39 FR 40192, Thursday, November 14, 1974), and Congress has debated making such an effort mandatory (Congressional Record, September 30, 1976, p. H11977). The basic thrust of such a certification will be to qualify a part for use in maintenance under the Emissions Performance Warranty. The provisions of subsection (c) will remain inoperative until such a program is established.

Subsection (e) deals with another parts issue; specifically, the question of warranty coverage for parts without a definite replacement interval. Current practice today illustrates that many parts are subjected in maintenance instructions to a check or inspection, with replacement only if the part is found defective. Such an instruction is not necessarily undesirable since it can lead to the discovery and correction of component failures. However, the instruction raises the question as to whether the part is warranted beyond its first check point, or whether protection ends there with any extra life of the part being simply a benefit to the owner. The regulations specify that, for purposes of the Emissions Performance Warranty, such a part is covered for the full 5 year/50,000 mile period. In other words, the manufacturer shall be liable for replacement of any part that does not have a definite replacement interval and which becomes the basis of a claim under the Emissions Performance Warranty.

The Agency realizes that this approach may cause the routine replacement of some parts which might otherwise, depending on the circumstances of the vehicles's usage, render adequate service for a substantially longer period of time. However, this approach might also cause the design of longer lived parts. In any event, to allow such an instruction to insulate a manufacturer from liability for a part failure could render the warranty totally ineffective since a manufacturer could provide such an instruc-

tion for every part which could possibly fail. Further, this type of instruction is clearly aimed at correcting a failure after it has occurred, which is a warranty question, and not prevention of the failure, which in the Agency's view is the purpose of required maintenance.

In conjunction with these requirements, the proposal also requires that a manufacturer submit to EPA an estimate of the typical cost of each item to be replaced during maintenance required under the Emissions Performance Warranty, and the labor charge to replace it. EPA intends to make this information available to the public to enable vehicle purchasers to make some minimal comparisons among manufacturers as to the cost of the maintenance required pursuant to the Emissions Performance Warranty.

E. SECTION 85.2107 PROOF OF MAINTENANCE AND PROPER OPERATION

Section 85.2107 proposes detailed requirements as to the amount and types of proof that may be required from an owner to show compliance with the § 85.2103(a)(1) conditions to recovery under the Emissions Performance Warranty. Two major purposes are intended to be served here. First, such provisions are considered necessary to ensure a high degree of consistency with regard to interpretation of the "proper maintenance and operation" phrase. Without them, variations could be expected due to differing interpretations among those dealers and other agents of the manufacturer who are authorized to handle warranty claims, with little recourse for owners due to lack of bargaining power on their part. Some inconsistencies will still be inevitable, but the presence of detailed guidance in the owner's manual should considerably reduce the problem. Second, the provisions are intended to help reduce the anticompetitive potential of the warranty. Section 85.2105, as described, contains the basic prohibition of the proposal against tying of the warranty to "dealer service". However, in operation, problems related to the use of independent service facilities will most likely arise at the point at which proof of maintenance is required. Thus, the Agency believes that specific provisions on this issue are required.

The proposal is aimed, in essence, at preserving a car owner's present ability to have his vehicle maintained at any service facility, or to maintain it himself. This is sought to be balanced, however, against the ability of the manufacturer to avoid liability if the maintenance has not been correctly performed. Resolution of this conflict depends to a large extent on the interpretation given to the maintenance condition of the warranty.

One possible interpretation is that the Act requires the owner to be able to prove that each maintenance instruction was performed at the proper time and done correctly. This would place a large burden on those owners who have their vehicles serviced at independent facilities. The typical owner, in such an instance, is rarely in a position to make such a showing. He simply tenders his car to the shop, and returns when the work is completed. Thus, a question as to compliance with the maintenance condition would in all likelihood be resolved against him. The consequence of this interpretation is therefore to heavily favor protection of the manufacturer against improper maintenance, while discouraging use of independent facilities.

Another interpretation could be that the Act requires only that the owner make good faith efforts to obtain the requisite maintenance, with the manufacturer subsequently being held strictly liable for the emissions performance of the vehicle. In other words, the manufacturer would not be able to defend against a claim on the grounds that maintenance was not correctly performed. The requirement would be satisfied simply by tender of a vehicle to someone who held himself out as capable of following the manufacturer's instructions. The Agency believes that such an interpretation, although stringent, may be correct given the goals of the Act. Under it, manufacturers could be expected to react by reducing the amount and complexity of required maintenance, a procedure which could be expected to result in vehicles with lower emissions throughout their useful life and beyond.

A third alternative, and the one proposed in this notice, is to interpret the maintenance condition to require some initial showing by the owner, after which he will be presumed to have complied with the condition. The showing consists of evidence which the Agency believes will in most cases indicate that the work was correctly performed. However, the presumption is not made conclusive. The manufacturer may, with some exceptions, rebut the presumption by showing that the maintenance instructions have not been properly complied with. The burden of proof in this regard will be on the manufacturer, but, in most instances, he will be the party in the best position to meet such a burden. On the other hand, owners will be able to continue to have their vehicles maintained at competent independent facilities, rather than at dealerships, without risking loss of protection under the Emissions Performance Warranty simply because of that choice. The Agency believes that this approach best satisfies the intent behind the maintenance requirement of the Emission Performance Warranty; however, since this is a critical issue in the warranty, specific comments are requested. The actual provisions of the proposal are discussed below.

The basic element of the proposal is the subsection (a) provision that compliance with the maintenance requirement shall be presumed upon either of two showings, or a combination thereof, by an owner. First, presentation of a properly validated maintenance logbook shall be sufficient to raise the presumption. Second, a showing by the owner that he has submitted the vehicle to one who regularly engages in the business of servicing automobiles, and directed that person to perform the required maintenance in accordance with the manufacturer's published instructions, shall be sufficient to raise the presumption. The Agency hopes that the use of logbooks will eventually become the preferred method for proof of maintenance, and that it will result in a recognized, uniform procedure across the country for establishing compliance with the maintenance condition. However, a business receipt which contains the same information as would appear in the logbook shall be acceptable in lieu of a logbook entry. In either case, subsection (b) allows the manufacturer (with some exceptions discussed below) to rebut by proving that the required maintenance was not, in fact, correctly performed.

Subsection (c) preserves the right of an owner to establish, by means other than those of subsection (a), that his vehicle has been properly maintained; the distinction being the absence of any presumption here. Thus, an owner may have a more difficult task showing proper compliance with the maintenance condition under this subsection. For example, he may have to establish his own expertise to perform maintenance which is not specified as owner's maintenance by the manufacturer. The proposed standard is simply that of reasonable evidence. By its nature, this is something that will have to be determined on a case by case basis. Clearly, fair operation of the provision will require good faith on the part of owners, manufacturers, and dealers.

Subsection (d) proposes that a signed statement be accepted as proof of proper operation under the Emissions Performance Warranty. Due to the nature of the requirement of proper operation, the Agency believes that such a statement is all that can reasonably be demanded. No owner could disprove the negative, i.e., that he had not improperly operated his vehicle. The statement is not made conclusive since, if a vehicle exhibits obvious indications of improper operation, then a claim may be denied on that basis. However, in the absence of such a showing by the manufacturer, it is all that may be required. Subsection (e) establishes four exceptions to the ability of a manufacturer to escape liability on the basis of improper maintenance. The first is in the case of work performed by a dealer or other authorized agent of the manufacturer. Under general principles of Agency, the manufacturer must accept responsibility for such work.

The second exception is in the case of work performed on the vehicle to keep it in a safe operating condition. This is intended to allow for those instances where a vehicle will not function properly without adjustment causing it to exceed emission standards. The agency believes that such an adjustment may not affect protection under the Emissions Performance Warranty.

The third exception is intended to reach those instances where the manufacturer should have foreseen that the vehicle would not be properly main-

tained. This could be due to a number of reasons. For example, equipment necessary to adjust the engine may not be readily available in the field. The design of some emission related component may be such that it is too sensitive to be properly serviced by most mechanics. Instructions in the service manual may be incomplete, or too vague to ensure correct maintenance in most instances. If any of these conditions can be shown, or others which establish that the manufacturer should have foreseen that improper maintenance would result, then such improper maintenance may not be raised in defense of an Emissions Performance Warranty claim.

The fourth exception relates to maintenance and operation instructions not relevant to the particular failure of a vehicle to meet emission standards, and is intended to protect vehicle owners from unduly harsh application of the § 85.2103 (a)(1) conditions. If a vehicle fails due to a clearly defective component in one emission control system, the absence of maintenance to an unrelated component, or the existence of unrelated improper operation of the vehicle, should not relieve the manufacturer from liability.

Subsection (f) explicitly reserves the right of an owner to maintain his own vehicle. With regard to proof, such a person will have to, in general, meet the reasonable evidence criteria of subsection (c). An exception to this exists for those instructions listed as owner's maintenance under § 85.2104(c) of the proposal. For such maintenance, the manufacturer must set out the evidence which is desired as proof of compliance, presentation of which will then enable the owner to obtain the rebuttable presumption of subsection (a). The issue of owner maintenance is discussed in more detail in section IV.B. above.

Subsection (g) specifies requirements for proper validation of the maintenance logbook so as to satisfy subsection (a)(1). In general, this consists of the signature of the same individual who would otherwise sign a receipt sufficient to make the subsection (a)(2) showing. In the case of owner's maintenance, the owner himself shall be authorized to validate the logbook.

F. SECTION 85.2108 WARRANTY CLAIMS

A necessary element of effective operation of the Emissions Performance Warranty will be the existence of expeditious claim procedures. Section 85.2108, to this end, requires each manufacturer to establish such procedures. Given the typical manufacturer organization currently in effect, it is expected that they will involve a determination by a dealer, and perhaps subsequently by a zone representative, of the manufacturer. However, although it is expected that the vast majority of claims will be settled at these levels, the proposal does not contain any requirements related to them, except that the owner obtain an immediate decision at the point of first presentation of his vehicle for repair. The Agency is of the opinion that such details are best left to the discretion of each manufacturer.

The proposal does require that all procedures contain a designated final level of review, and that an owner be provided with a final decision on his claim within ten days of its receipt at that final level. This is deemed necessary to assure that owners whose vehicles do not pass a short test may obtain an expeditious determination as to the validity of their Emissions Performance Warranty. Owners facing sanctions due to a failed vehicle have a need to know, within a short period of time, whether a warranty claim will be honored, or whether they should seek repair at their own expense. In the case of a denied claim, an owner must also determine whether to pursue legal action against the manufacturer, and, for this reason, the proposal requires that a denial be accompanied by a written explanation.

The provision requiring review within ten days is supported by a proposal that the manufacturer be held liable for the cost of any repair work actually performed on a vehicle subsequent to the lapse of the notification period. An owner facing a penalty or sanction will be at an extreme disadvantage with regard to any time delay in the processing of his claim. This proposal, however, will ensure a fixed waiting time after which the owner will either know that his claim has been denied, or that his vehicle may be repaired at the manufacturer's expense. Hopefully, State and local jurisdictions will establish any inspection program deadlines in accordance with the warranty notification period.

A final question with regard to warranty claims is at what point in time a claim may be raised. Section 85.2108(a) specifically deals with this issue. Essentially, a cause of action under the Emissions Performance Warranty will exist upon satisfaction of all of the requirements of § 85.2103(a), subsection (3) of which states that an owner must bear a penalty or sanction as a result of a short test failure. Operation of this provision may be complicated by the fact that jurisdictions are not expected to impose any penalty at the first failure of an emissions test. Rather, the owner of a failed vehicle will probably simply be required to have the vehicle serviced, and then undergo a retest within a specified period of time. Even in the case of repeated failures, penalties or sanctions may not be imposed beyond a requirement that the owner demonstrate that a certain amount of corrective maintenance has been performed on the vehicle. Use of fines or suspensions in some jurisdictions is expected to be limited to those situations where the owner either refuses to undergo a test at all, or refuses to have corrective maintenance or repair performed on his vehicle after it fails a test.

The § 85.2103(a)(3) condition could be held to require an owner to either violate State or local law so as to incur a fine, or at the least be without the use of his vehicle, before an Emissions Performance Warranty claim could be raised. However, such an interpretation could hardly be ascribed to Congress in passing this provision (section 207(b)(2)(C) of the Act). The Agency believes that the purpose of this condition is simply to limit the warranty to those situations in which repair of the vehicle is mandatory. Consequently, the proposal specifically holds that a warranty cause of action arises immediately upon failure of a short test if the owner is required to take any corrective action as a result of that failure. The owner need not ignore a given grace period, and actually incur a penalty or sanction before the warranty becomes operational.

G. SECTION 85.2109 WARRANTY REMEDY

As stated in § 85.2103(a), the manufacturer's obligation under the Emissions Performance Warranty is to "remedy the nonconformity at no cost to the owner." The Agency's interpretation of this requirement is set out in § 85.2109. Subsection (a) deals with the precise remedy involved. It is, in essence, to place the vehicle in a conforming condition. A temporary fix, sufficient only to enable the vehicle to pass an emissions retest is unacceptable. Further, this liability is specifically clarified as being independent of any State or local limitation on the penalty or sanction required to trigger warranty protection under § 85.2103(a)(3). EPA anticipates that many jurisdictions will set a limit on repair expense after which an owner will be required to take no more action despite the fact that his vehicle continues to fail to conform to emission standards. Alternatively, owners may simply be fined if their vehicles fail I/M inspections. However, the Agency believes that such provisions should not act to limit protection under the Emissions Performance Warranty. The "penalty or sanction" paragraph of section 207(b) does restrict the applicability of the warranty to those areas with mandatory inspections, and most likely will further restrict the potential frequency of claims in those areas to annual or semi-annual periods. But, given a mandatory test with some penalty or sanction attached, the Act is clear that the warranty remedy, if obtainable, is for the manufacturer to "remedy the nonconformity". The decision by a State or locality to fix a maximum penalty or sanction for its citizens cannot affect this potential Federal liability of a manufacturer under the warranty.

Subsection (b) speaks to the cost of repair, and emphasizes the requirement that a manufacturer bear the entire cost regardless of a failed vehicle's proximity to its next scheduled maintenance point. Thus, for example, if the required remedy for a failed vehicle is a new set of spark plugs, the manufacturer must provide them without cost even though the vehicle would have been scheduled to receive a new set, at the owner's expense, within a short period of time. In sum, the cost of a repair may not be split pro rata based on the vehicle's position within the required maintenance schedule, or on any other criteria.

Under this provision, an owner may thus obtain a free tune-up when he would not have received one had his vehicle failed a week later at the maintenance interval. The Agency believes that this approach, although strict, is required by the Act. No problem arises if a vehicle fails due to a defect in a non-maintenance item since the time of such a failure is irrelevant to responsibility for repair. However, the Agency anticipates that many failures will be correctable simply by performance of routine maintenance, albeit at an earlier stage than that scheduled. In these cases, the time of failure will be determinative of responsibility, and, under the Emissions Performance Warranty, this can mean only complete responsibility. The purpose of the warranty is to ensure that a properly maintained and operated vehicle will perform within emissions standards at all times during its useful life. Although the need for routine maintenance implies that a vehicle will naturally vary in its emissions as maintenance items deteriorate, at no time should emissions exceed standards. Thus, failure of a short test indicates a problem outside of normal parameters. This, by the very nature of the warranty, must be corrected at the manufacturer's expense regardless of the point in time at which it is discovered.

Subsection (c) deals with a secondary problem related to the performance of routine maintenance as a repair under the Emissions Performance Warranty; that is, the fact that such work will affect the maintenance schedule. Clearly, parts replaced within a short time of their scheduled replacement need not be replaced again at the scheduled point, as it would only result in the needless waste of many parts. The proposal thus requires that a manufacturer adjust the maintenance schedule under these circumstances, and inform the owner of the new periods at the time of the warranty repair.

The issue of the effect of unscheduled maintenance, whether performed under the warranty or at an owner's request, is of general importance to this proposal. Experience shows that few vehicles can be expected to rigidly adhere to any maintenance schedule throughout a 5 year/50,000 mile period. Thus, particularly at later periods in a car's useful life, the question of compliance with the maintenance condition of § 85.2103(a)(1) may involve analysis of a record quite different from that envisioned by the applicable schedule. The Agency is concerned that this variable may confuse the determination of entitlement to protection under the Emissions Performance Warranty, especially in cases where the remedy is strictly maintenance oriented. Comments are particularly desired as to how this problem should be approached in any final regulations.

H. SECTION 85.2110 INCLUSION OF WARRANTY PROVISIONS IN OWNER'S MANUALS

The key to obtaining effective implementation of any warranty lies in full disclosure of its provisions to the warrantee. Accordingly, the proposal contains specific requirements intended to ensure that complete information regarding the Emissions Performance Warranty is supplied to vehicle owners. Section 85.2110 contains all of these requirements. Most are felt to be self explanatory, and are thus not discussed below.

In general, disclosure must be made in the vehicle owner's manual, which is intentionally defined broadly to allow flexibility in the presentation of the warranty information. Many manufacturers have separate warranty and/or maintenance booklets today for their own warranty or the Clean Air Act Section 207(a) warranty. This approach is at least equivalent to if not better than inclusion in the owner's manual proper, and the Agency hopes that similar type presentations will be adopted for the Emissions Performance Warranty.

The owner's manual need only contain a brief listing of the maintenance schedule, as is current practice today; provided that full descriptions of all procedures are set out in the service manual, those manuals are available, and the owner can obtain a copy of those procedures related to the Emissions Performance Warranty by mail, at nominal cost. This compromise to requiring that complete procedures be in all owner's manuals is proposed recognizing that few owners have a need for detailed instructions, and that presentation in the service manual is the established practice today. With regard to any maintenance designated as "owner's maintenance", this rationale may not be applicable, and the regulations thus require complete detailed instructions in the owner's manual for these procedures.

The owner's manual is also required to contain a logbook for the purpose of verifying compliance with the maintenance condition of the warranty. The Agency believes that this is a preferred approach to requiring that owners retain receipts for all maintenance services, although, as previously discussed, business receipts are acceptable under the proposal.

I. REVIEW OF MANUALS AND DISAPPROVAL OF MAINTENANCE AND OPERATION INSTRUCTIONS

Section 85.2111 of the proposal requires that all owner's and service manuals be submitted to the Agency for review pursuant to this subpart. In the case of maintenance and operation instructions which are determined to be out of compliance, either on their face or in actual practice, § 85.2112 provides for disapproval of such with the consequence being that they subsequently cease to be part of § 85.2103(a)(1) condition to recovery under the warranty.

No disapproval may be effected without notice to the manufacturer, an opportunity for him to present his views and evidence at an Agency hearing on the record, and publication in the FEDERAL REGISTER. Once an instruction is disapproved, however, the manufacturer will be required to send notification by mail to all owners, and the disapproval will be included in a compilation by the Agency for distribution to all interested parties.

Specific comments are requested as to the desired scope of any hearing held with regard to disapproval of a maintenance or operation instruction, including limits, if any, to be placed on discovery, intervention, cross-examination, and appeal.

V. COST OF IMPLEMENTATION

The major Agency cost involved in the implementation of the Emissions Performance Warranty will stem from whatever yearly testing is required in order to set cut-points (pass/fail points) for the various short tests identified in the subsection 207(b)(1) proposal being published today. Manufacturer costs will relate to administration of the warranty, and loss of sales due to price increases made to cover expected repair costs. An economic analysis of these factors has been prepared by the Agency and is available for inspection and copying at the U.S. Environmental protection Agency, Public Information Reference Unit, Room 2922 (EPA Library), 401 "M" Street, S.W., Washington, D.C. 20460. Single copies may be obtained by writing to: Environmental Protection Agency, Mobile Source Enforcement Division, Warranty Project (EN-340), 401 "M" Street, S.W., Washington, D.C. 20460.

The Agency is particularly interested in obtaining information related to the potential economic impacts of the Emissions Performance Warranty, and specifically requests comments on this topic with supporting data if available.

VI. ENVIRONMENTAL IMPACT

No adverse environmental impacts are anticipated by these regulations. As previously discussed, the warranty is basically only a cost-shifting mechanism. It will indirectly lead to some air quality benefits to the extent that it encourages implementation of State and local "Inspection/Maintenance" programs in areas which would otherwise not have them, causes more stringent standards to be enforced, induces owners to devote more attention to properly maintaining their vehicles, and influences manufacturers to build more durable emission control systems. However, the warranty itself does not contain any such impact.

No voluntary environmental impact statement has been prepared pursuant to EPA guidelines set forth in 39 FR 37419. The Emissions Performance Warranty is primarily directed at light duty vehicles, whose emission standards are specifiacilly exempted from the EIS requirements.

VII. COMMENTS

Interested persons are encouraged to participate in this rulemaking proceeding by submitting written comments (ten copies are requested) to: Director, Mobile Source Enforcement Division (EN-340), Room 3220 (WSM), Environmental Protection Agency, 401 "M" Street, S.W., Washington, D.C. 20460.

All comments received before the close of business on the comment closing date

will be considered. All comments will be available for inspection and copying at the U.S. Environmental Protection Agency, Public Information Reference Unit, Room 2922 (EPA Library), 401 "M" Street, S.W., Washington, D.C. 20460.

Final regulations, modified as the Administrator deems appropriate after consideration of comments, will be promulgated as soon as practicable after such consideration and will be applicable to model year 1979 and later light duty vehicles and light duty trucks.

This notice of rulemaking is issued under authority of the following sections of the Clean Air Act as amended: 207 (42 U.S.C. 1857f–5(a)), 208 (42 U.S.C. 1857f–6) and 301(a) (42 U.S.C. 1857g). The regulations would implement section 207(b) of the Clean Air Act of 1970.

NOTE.—The Environmental Protection Agency has determined that this document does not contain a major proposal requiring preparation of an Inflation Impact Statement under Executive Order 11821 and OMB Circular A–107.

Dated: May 6, 1977.

DOUGLAS M. COSTLE,
Administrator.

Accordingly, notice is hereby given that Part 85 of Title 40 of the Code of Federal Regulations is proposed to be revised by the addition of a new Subpart V as set forth below.

Subpart V—Emissions Control System Performance Warranty Regulations

Sec.

85.2101 General applicability.
85.2102 Definitions.
85.2103 Warranty.
85.2104 Instructions for maintenance and proper operation.
85.2105 Prohibition against brand name requirements.
85.2106 Replacement parts.
85.2107 Proof of maintenance and proper operation.
85.2108 Warranty claims.
85.2109 Warranty remedy.
85.2110 Inclusion of warranty provisions in owner's manuals.
85.2111 Review of warranty statement, maintenance and operation instructions.
85.2112 Maintenance and operation instruction disapproval.

Subpart V—Emissions Control System Performance Warranty Regulations

§ 85.2101 General applicability.

The provisions of this subpart are applicable to all 1979 and later model year light duty vehicles and light duty trucks.

§ 85.2102 Definitions.

(a) As used in this subpart, all terms not defined herein shall have the meaning given them in the Act:

(1) "Act" means Part A of Title II of the Clean Air Act, 42 U.S.C. 1857 (f)–1 through (f)–7, as amended by Pub. L. 91–604 and 93–319.

(2) "Administrator" means the Administrator of the Environmental Protection Agency or his authorized representative.

(3) "Emission control device or system" means any system, assembly, device, or component thereof which can affect emissions.

(4) "Emissions Performance Warranty" means that warranty given pursuant to this subpart.

(5) "EPA-approved emission tests" means a test prescribed under 40 CFR 85.2201 et seq.

(6) "Light duty truck" means any motor vehicle related at 8,500 pounds GVWR or less with a vehicle curb weight of 6,000 pounds or less, and a basic vehicle frontal area of 46 square feet or less, which is:

(i) Designed primarily for purposes of transportation of property or is a derivation of such a vehicle, or

(ii) Designed primarily for transportation of persons, and having a capacity of more than 12 persons, or

(iii) Available with special features enabling off-street or off-highway operation and use.

(7) "Light duty vehicle" means a passenger car or passenger car derivative capable of seating 12 passengers or less.

(8) "Model year" means the manufacturer's annual production period (as determined by the Administrator) which includes January 1 of such calendar year; however, if the manufacturer has no annual production period, the term "model year" shall mean the calendar year.

(9) "Owner" means the ultimate purchaser or any subsequent purchaser of a vehicle.

(10) "Owner's Manual" means the instruction booklet normally provided to the purchased of a vehicle, and any other written information pertaining to the operation, maintenance, specifications, description or warranty of the vehicle provided with that booklet.

(11) "Service Manual" means that book provided by the manufacturer for use by vehicle service personnel in maintaining and repairing vehicles.

(12) "Useful Life" means a period of use of 5 years or 50,000 miles, whichever first occurs.

§ 85.2103 Warranty.

(a) The manufacturer of each vehicle to which this subpart applies shall warrant the emission control device or system of the vehicle such that if:

(1) The vehicle is maintained and operated in accordance with the manufacturer's instructions under the Emissions Performance Warranty, as set out in the owner's manual, and

(2) It fails to conform, for a period of 5 years or 50,000 miles, whichever first occurs, to the applicable emissions standards of the U.S. Environmental Protection Agency, as judged by an EPA-approved emission test, and

(3) Such nonconformity results or will result in the owner of the vehicle having to bear any penalty or other sanction (including the denial of the right to use the vehicle) under State or Federal law, then the manufacturer shall remedy the nonconformity at no cost to the owner.

(b) The warranty period shall begin on the date the vehicle is delivered to its ultimate purchaser, or if the vehicle is first placed in service as a demonstrator or company car prior to such delivery, on the date it is first placed in such service.

§ 85.2104 Instructions for maintenance and proper operation.

(a) Maintenance required under the Emissions Performance Warranty must be reasonable and necessary to assure the proper functioning of the emission control device or system of the vehicle, including that it be likely to be performed on in-use vehicles. Instructions shall be specific as to the exact procedures required, and the intervals at which they are to be performed.

(b) Maintenance instructions shall be set out such that one who regularly engages in the business of servicing automobiles will be able to satisfactorily comply with them.

(c) A manufacturer may specify those maintenance instructions which, in his opinion, are capable of being performed by a vehicle owner. Each instruction shall contain the complete procedure to be followed, and the documentation necessary to establish that it has been performed so as to qualify the owner to validate the maintenance logbook under § 85.2107(g)(2).

(d) Operation instructions applicable to the Emissions Performance Warranty must be reasonable and necessary to assure the proper functioning of the emission control devices or systems of the vehicle, including that they be consistent with the normal use for which the vehicle is sold.

§ 85.2105 Prohibition against brand name requirements.

(a) No maintenance or operation instruction issued pursuant to the Emissions Performance Warranty may include any condition on the use of any component or service (other than a component or service provided without charge under the terms of the purchase agreement) which is identified by brand, trade, or corporate name; or directly or indirectly distinguish between service performed by the franchised dealers of the manufacturer or any other service establishments with which the manufacturer has a commercial relationship, and service performed by independent automotive repair facilities with which the manufacturer has no commercial relationship, except that the prohibition of this section may be waived by the Administration if:

(1) The manufacturer satisfies the Administrator that the vehicle will function properly only if the component or service so identified is used in connection with the vehicle, and

(2) The Administrator finds that such a waiver is in the public interest.

§ 85.2106 Replacement parts.

(a) Unless specified otherwise by the vehicle manufacturer, compliance with instructions to replace parts during maintenance under the Emissions Performance Warranty shall require only the use of parts identified by their manufacturer as replacement parts for the specific vehicle in question.

(b) A vehicle manufacturer may specify that all parts replaced during maintenance under the Emissions Performance Warranty be equivalent, from an emissions standpoint, to the original equipment parts of the vehicle, or set out some other criteria for acceptability (from an emissions standpoint) not in conflict with § 85.2105; *Provided*, that the owner's manual contains complete information necessary to determine whether a given part is so equivalent or meets the acceptability criteria.

(c) In all cases, a part certified, in accordance with criteria and procedures sanctioned by the Administrator, to be an equivalent replacement part for a specific vehicle in question shall be acceptable for use during maintenance under the Emissions Performance Warranty.

(d) Notwithstanding the above, a manufacturer may avoid liability under the Emissions Performance Warranty if he can show that a particular failure of an Agency-approved emission test is caused by a non-original equipment replacement part. For purposes of this section, any part authorized by the vehicle manufacturer to be sold as a replacement part for a vehicle in question shall be considered an original equipment replacement part.

(e) A part not required to be replaced at a definite interval shall be considered as warranted for the full term of the Emissions Performance Warranty. Diagnostic maintenance instructions, that is, instructions to replace a component only if checked and found to be operating below specification, shall have no bearing on warranty coverage. The manufacturer shall be liable for any such part which becomes the basis of a claim under the Emissions Performance Warranty.

§ 85.2107 Proof of maintenance and proper operation.

(a) Upon presentation of a vehicle for repair under the Emissions Performance Warranty, an owner shall be entitled to a rebuttable presumption that the requirement of § 85.2103(a)(1) that a vehicle be maintained in accordance with the manufacturer's instructions has been met upon:

(1) Presentation of a properly validated maintenance logbook for that vehicle, or

(2) A showing that he has submitted the vehicle, at the specified intervals, to someone who regularly engages in the business of servicing automobiles, and directed that person to perform the specified maintenance in accordance with the manufacturer's instructions for that vehicle, or

(3) Any combination of the above, which, taken together, covers all of the required maintenance for the vehicle.

(b) A manufacturer may rebut the presumption of paragraph (a) of this section by showing that the maintenance instructions required under the Emissions Performance Warranty have not been properly complied with.

(c) In the absence of a showing as set out in paragraph (a) of this section, a manufacturer shall nevertheless consider the § 85.2103(a)(1) maintenance condition satisfied upon receipt of reasonable evidence that the required maintenance was performed at the proper intervals and likely to have been done correctly, unless the manufacturer can show that such is not the case.

(d) The requirement of § 85.2103(a)(1) that a vehicle be operated in accordance with the manufacturer's instructions shall be considered satisfied upon receipt of a signed statement by the owner that he has properly operated the vehicle, unless the manufacturer can show that such is not the case.

(e) Despite inability of an owner to meet any of the above requirements, a manufacturer may in no case deny a warranty claim on the basis of:

(1) Work improperly performed by a dealer or other authorized service agent of the manufacturer,

(2) Work performed on the vehicle to rectify an unsafe condition, including a driveability condition that is unsafe, attributable to the manufacturers.

(3) Work improperly performed or not performed due to the design of the vehicle, an impractical maintenance procedure, unavailability of necessary tools or instruments, or other cause which the manufacturer should have foreseen would result in such improper maintenance or lack of maintenance, or

(4) Noncompliance with any maintenance or operation instruction which the owner can show is not relevant to his vehicle's particular failure of an EPA-approved emission test.

(f) Nothing in this subpart shall be construed to prevent an owner from personally performing all of the required maintenance for his vehicle under the Emissions Performance Warranty.

(g) Proper validation of the maintenance logbook, as specified in paragraph (a)(1) of this section, shall consist of completed entries for only those items required by § 85.2110(b)(2), and the signature of either:

(1) Someone who regularly engages in the business of servicing automobiles, or

(2) The owner, in the case of items classified as owner's maintenance pursuant to § 85.2104(c) and for which the owner possesses the required documentation under that paragraph.

§ 85.2108 Warranty claims.

(a) A claim under the Emissions Performance Warranty may be raised immediately upon failure of an EPA-approved emission test if, as a result of that failure, an owner is required to take action of any kind in order to avoid imposition of a penalty or sanction. An owner need not suffer the loss of the right to use his vehicle, be fined, incur repair expenses, or actually bear any such penalty or sanction to satisfy the requirement of § 85.2103(a)(3). That requirement shall be met if a test failure sets a procedure in motion under which the owner will bear such a penalty or sanction if his vehicle is not brought into conformity, or repaired to some specified extent.

(b) Each manufacturer shall establish procedures as to the manner in which a claim under the Emissions Performance Warranty may be raised. The procedures shall require an immediate decision by the dealer, or other person to whom a vehicle is initially presented for repair, as to the validity of the claim, and shall designate a final person or office to which vehicle owners may appeal a refusal by a dealer or other agent of the manufacturer to honor a claim.

(c) Within 10 days of the receipt of an appeal by such person or office, the manufacturer shall either honor the claim or provide the owner, in writing, an explanation of the basis upon which the claim is being denied. Failure to so notify shall result in the manufacturer being liable for the cost of any subsequent work actually performed on the vehicle in order to bring it into compliance with applicable emission standards.

§ 85.2109 Warranty remedy.

(a) The manufacturer's obligation under the Emissions Performance Warranty shall be to make such adjustments or repairs as are necessary to assure that the vehicle complies with applicable emission standards of the U.S. Environmental Protection Agency, that it will continue to comply for the remainder of its useful life (if proper maintenance and operation is continued), and that it will operate in a safe manner. State or local limitations as to the extent of the penalty or sanction imposed upon an owner of a failed vehicle shall have no bearing on this liability.

(b) Under the Emissions Performance Warranty, the manufacturer shall be liable for the total cost of the remedy of any vehicle validly presented for repair, to any authorized service facility of the manufacturer.

(c) If, in the course of remedying a nonconformity under the Emissions Performance Warranty, parts are replaced or work is performed which would otherwise have been scheduled at some future time under the maintenance instructions, then the manufacturer must adjust those instructions to reflect new periods for the particular vehicle in question based on the time of the warranty repair. The owner shall be informed of the new schedule at the time of the repair under the Emissions Performance Warranty.

§ 85.2110 Inclusion of warranty provisions in owner's manuals.

The owner's manual for each vehicle to which the regulations of this subpart are applicable shall contain, at a minimum, the following information:

(a) *Warranty statement.* A basic statement of the coverage of the Emissions Performance Warranty as set out in § 85.2103. This shall be separated from any other warranty given by the manufacturer, and be prefaced by the title "Emissions Performance Warranty" set in bold face type.

(b) *Maintenance and operation instructions.* All maintenance and operation instructions intended by the manufacturer to be included in the § 85.2103

(a)(1) condition to recovery under the Emissions Performance Warranty.

(1) Maintenance instructions shall be separated from any general maintenance requirements or suggestions of the manufacturer, and shall be prefaced by the title "Required Instructions for Maintenance Under the Emissions Performance Warranty" set in bold face type. This requirement may be satisfied by a short statement of services to be performed if:

(i) The service manual for the vehicle contains a full description of all required maintenance,

(ii) Such manuals are readily available to the general public at the beginning of the model year for the vehicle, and

(iii) The ultimate purchaser of the vehicle is provided with an opportunity to obtain a copy of those instructions relevant to the warranty, by mail, at a nominal cost.

(2) In all cases, the owner's manual shall contain a "maintenance logbook" consisting of an abbreviated listing of the required maintenance in a format to facilitate the collection and storage of all information pertaining to the question of compliance with the maintenance condition. This shall include space for recording of the date and vehicle mileage at which point each instruction or group of instructions is performed, and the signature of the individual performing such, certifying that the manufacturer's procedures have been followed. In the case of maintenance pursuant to § 85.2104(c), space shall also be provided for the owner to certify that he can meet all of the documentation requirements of the manufacturer for such maintenance.

(3) Operation instructions shall be set out in full, separated from any general operation requirements or suggestions of the manufacturer, and shall be prefaced by the title "Required Instructions For Operation Under the Emissions Performance Warranty" set in bold face type.

(c) *Owner's maintenance.* Maintenance instructions, if any, provided pursuant to § 85.2104(c). All such instructions, with required documentation, shall be set out, in full, and shall be prefaced by the title "Owner's Maintenance" set in bold face type. Any procedures listed under this heading must also appear in the maintenance listing required under § 85.2110(b)(1).

(d) *Proof of compliance with required maintenance and operation instructions.* The provisions of § 85.2107 shall be set out under the heading "Proof of Compliance With Required Instructions Under the Emissions Performance Warranty" set in bold face type.

(e) *Replacement parts statement.* A statement as to acceptability of replacement parts for use in maintenance under the Emissions Performance Warranty which comports with the requirements of § 85.2106. The statement shall appear under the title "Replacement Parts for Maintenance Under the Emissions Performance Warranty" set in bold face type, and shall contain:

(1) An explanation of the manufacturer's criteria for choice of acceptable replacement parts along with complete specifications sufficient to determine that acceptability for any given part, or

(2) In lieu of paragraph (e)(1) of this section, a statement that use of any part identified by its manufacturer as a replacement part for the specific vehicle in question will be acceptable, and

(3) In all cases, a statement that use of any part certified under the authority of the U.S. Environmental Protection Agency to be an equivalent replacement part for the specific vehicle in question will be acceptable.

(f) *Warranty claims.* Complete instructions as to when and how an owner may bring a claim under the Emissions Performance Warranty, as governed by § 85.2108. Instructions shall appear under the title "Emissions Performance Warranty Claims" set in bold face type, and shall include:

(1) An explanation of the point in time at which a claim may be raised,

(2) Step-by-step procedures as to the manner in which a claim may be raised,

(3) A clear designation and address of the final claim review person or office of the manufacturer, and

(4) The provision regarding failure of the manufacturer to respond within 10 days of an appeal to that person or office.

§ 85.2111 Review of warranty statement, maintenance and operation instructions.

(a) EPA will review owner's manuals and service manuals to ensure that the Emissions Performance Warranty and its accompanying maintenance and operation instructions have been included in accordance with the requirements of this subpart.

(b) For purposes of such review, the manufacturer of each vehicle to which this subpart applies shall submit two copies to EPA of the owner's manual and service manual for each such vehicle, in the final printed format in which they are to be distributed. The manuals should be received by EPA prior to the introduction of the vehicle for sale.

(c) At the same time, the manufacturer shall submit an estimate of the cost of each item to be replaced during maintenance required under the Emissions Performance Warranty, and the labor charge to replace it, for each vehicle to which this subpart applies. Such submission need not be made to the extent that it would duplicate information already being provided to EPA pursuant to existing regulations or guidelines.

(d) All materials should be sent to: Director, Mobile Source Enforcement Division (EN–340), Environmental Protection Agency, 401 "M" Street SW., Washington, D.C. 20460.

§ 85.2112 Maintenance and operation instruction disapproval.

(a) Any maintenance or operation instruction may be disapproved upon a determination by EPA that it does not, in practice, satisfy the criteria set out in § 85.2104 for inclusion of such instructions.

(b) No disapproval shall be effected without affording the manufacturer reasonable notice in writing, and an opportunity to present his views or evidence at an Agency hearing on the record.

(c) A disapproval shall become effective upon publication of such in the FEDERAL REGISTER.

(d) Upon disapproval, an instruction shall cease to be a condition to manufacture liability under § 85.2103(a)(1). No warranty claim may be denied on the basis of non-compliance with such an instruction, or on the basis of emissions degradation due to attempts to comply.

(e) The manufacturer shall be required to mail notification of any disapproval to the owners of all affected vehicles, with an explanation of the implication of such with regard to protection under the Emissions Performance Warranty. Manufacturers shall ascertain the current addresses of owners in a manner to be approved by the Administrator.

(f) EPA may periodically publish a list of all disapproved instructions for distribution to emissions inspection facilities, and any other interested persons. Copies may be obtained by writing to: Public Information Office, Environmental Protection Agency, 401 "M" Street SW., Washington, D.C. 20460.

(g) Failure of EPA to disapprove any intruction shall have no bearing on the propriety of such instruction when considered in light of § 85.2107(e)(3).

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